R. Belkin
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Fundamentals of Criminalistics

Progress Publishers

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Moscow

Translated from the Russian by *Joseph Shapiro*
Designed by *Yuri Davydov*

Р. Белкин, Ю. Корухов
ОСНОВЫ КРИМИНАЛИСТИКИ
На английском языке

© Издательство «Прогресс», 1986
English translation © Progress Publishers 1987

Printed in the Union of Soviet Socialist Republics

Б $\frac{1203120000-203}{014(01)-87}$ 63—86

PREFACE

Most capitalist and developing countries have, in recent years, experienced a rising crime rate and a change in the pattern of crimes, and this has resulted in the need to develop and use effective means for exposing and investigating crimes. In socialist countries, however, this need is not connected with increasing crime, but with the task to completely eradicate crime and its underlying causes.

Criminalistics, a science that develops a system of special techniques and methods for collecting, establishing, investigating and using evidence to be presented in court, is designed to serve the purposes of combatting crime. In addition, criminalistics develops preventive measures for averting crime.

Criminalistics is a relatively young science. Originating around one hundred years ago, it has from the very outset developed in different countries along different lines, and its current state also differs depending on the area. This book is primarily designed to provide basic ideas on criminalistics, its functions and essence, as seen by Soviet criminologists. Still, the authors have sought to select those provisions that are essentially common to all countries and could be used universally.

The book is intended for the layman, and for that reason the authors have tried to combine a scientific approach with readily intelligible explanations.

Those who would like to further their knowledge in some specific field of criminalistics should bear in mind that every chapter in this book is based on extensive literature, chiefly in Russian, English, German and French, and that this work gives an account of only the fundamentals of the science and, hence, cannot replace the special literature that a detective, interrogator or judge should read.

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Chapter 1

WHAT IS CRIMINALISTICS? CONTEMPORARY IDEAS ON ITS NATURE, SYSTEM AND GOALS

1. THE ORIGINS OF CRIMINALISTICS

Some sciences have appeared within the present generation, others originated in ancient times, when man first learned to count his fingers and observe the stars. As for criminalistics, it is really hard to determine exactly when it appeared.

For ages people in India have known how to recognise animal and human tracks. With time, masters of the art even formed their own caste to pass their secrets from generation to generation. In the Red Indian tribes of North America, every warrior and hunter had to know how to "read tracks".

The ability to follow tracks and shadow a person was an art. In fact, the ancients shadowed both wild animals and criminals, and it is no wonder that *The Laws of Manu,* one of the oldest Indian legal documents, generally likened criminal investigation to hunting.

Initially, community members themselves used to shadow criminals; then, with the emergence of the state and the law, this was done by specially designated officials. Until the beginning of the 19th century, they were only guided by their own professional experience plus quickness of wit. True, there is historical evidence of the existence of special manuals concerning some technical aspects of criminal investigation. For example, the *Hsi Jüan Lu* published in China in the mid-13th century mentioned the rules of a *post mortem* inspection. We also know of two books which mention the examination of documents by experts. Both were published in Paris: one by Desmesle in 1604 and the other by Raveneau in 1665. However, the Chinese manual never reached Europe; Desmesle's book did not find a broad readership; and Raveneau's work on document forgery was burnt at the command of the judiciary on February 10, 1670.

Indeed, the fact that in those times the investigator's only as-

sets were his common sense, experience and professional power of observation made the disclosure of crimes a kind of art, and often simply a matter of luck. It is hardly surprising, therefore, that it could be mastered only by a few.

While crimes were relatively few and not too complicated, society had no great need for more than a handful of individuals who knew how to expose them. But crime changed both quantitatively and qualitatively under capitalism. When organised crime became an established fact and professional criminals began to use modern means of communication and transport and increasingly sophisticated criminal means of committing and concealing their crimes, police and criminal investigation departments in the West were utterly unable to effectively combat the transgressors.

Society could no longer rely on the acumen of investigators; in fact, the business of investigation itself had to be scientifically based. This resulted in the appearance of a new field of knowledge designed to introduce the natural and applied sciences in legal proceedings.

The term *criminalistics* was first used by Hans Gross (1847-1915), a court investigator and later university professor, who in 1892 published a fundamental work entitled *Handbuch für Untersuchungsrichter (A Manual for Court Investigators).* Here he summarised and systematised the technical aids and techniques for combatting crime developed by his predecessors and himself which were chiefly based on evidence provided by the natural sciences for the needs of criminal investigation. In an article on the tasks and objectives of criminalistics published in 1897 in *Schweizer Zeitschrift für Strafrecht,* Gross based the need for distinguishing among those sciences dealing with criminal law a special science "on the realities of criminal law", which he proposed to call *criminalistics.* The third edition of *A Manual for Court Investigators* (1899) was already entitled *Handbuch für Untersuchungsrichter als System der Kriminalistik (A Manual for Court Investigators as a System of Criminalistics).*

Gross was not the first to turn to the need for developing scientific methods of crime investigation. Back in 1838, L. Jagemann, in the preface to his two-volume *Handbuch der gerichtlichen Untersuchungskunde (A Manual on the Art of Court Investigation)* noted that his objective was no less than to develop

a self-contained new discipline on crime investigation. In the first half of the 19th century, several works on crime investigation also appeared in Russia: Ya. Barshev *(The Basics of Criminal Legal Proceedings,* 1841); N. Orlov *(Concise Handbook for Criminal Investigation,* 1833); N. Kalaidovich *(Instructions on the Execution of Criminal Investigations,* 1849), and so on. Europe was still basically unaware of Gross, when Alphonse Bertillon (France) was already taking the first steps in applying the anthropometric method in recording crime, and William J. Herschel and Henry Faulds (Great Britain) had discovered independently of each other the properties of finger patterns that subsequently formed the basis of dactyloscopy, a major technique for identifying people. Yet Gross was the first to have proposed a system of scientific investigation methods; hence, the origin of criminalistics is usually associated with his name.

The young science of criminalistics was not immediately recognised and used by investigators and judges. In 1907, in a report to the French President, the Minister of Justice stated that no progress had been made in developing new methods for disclosing the truth, and that meanwhile criminals were enjoying all the conveniences of speedy travel to hastily retreat from the scene of the crime and create alibis for themselves. In fact, stressed the Minister, criminal methods improved with the progress of science, whereas the techniques of criminal pursuit remained static. But a few years later the situation began to change. One after another, bourgeois governments in Europe and America began to take radical measures to reorganise their police and provide criminal investigation departments with recommendations of the rapidly developing science of criminalistics.

The latter developed chiefly along two lines. In Great Britain, France, Italy and some other European countries, the accent was on developing technical aids and methods for investigating material evidence. As a result, criminalistics in those countries became a purely technical discipline, and those involved began to call it police technique or investigative police methods. On the other hand, Germany laid greater emphasis on developing the tactics of criminal investigation and procedural recommendations for investigating specific crimes.

In 1889, E.F. Burinsky (1849-1912) an outstanding Russian forensic photographer, used his own money to found a forensic

photo laboratory at the St. Petersburg District Court. This lab was the first expert institution for criminal research in Russia. However, due to a shortage of funds, the lab was unable to function well and officials from the procurator's office and the court avoided scientific methods for investigating evidence, ignoring the opportunities for criminalistic examination.

The forensic photo laboratory under the procurator of the St. Petersburg Chamber of Justice, the first government expert institution in Russia, began to function in January 1893. However, it could not fully satisfy the requirements of tsarist Russia's punitive bodies. It was only in the face of the growing revolutionary movement and the desire to use scientific methods primarily to combat the latter, that the tsarist government, in 1912-1914, set up panels for scientifically-based forensic examination in St. Petersburg, Moscow, Kiev and Odessa. However, these did not function long, and actually broke up at the beginning of the First World War.

Following the victory of the Great October Socialist Revolution, the young Soviet Republic instantly declared that it would relentlessly fight crime and all the social scum that usually rises from the bottom during great social upheavals.

Those were hard times. Battered by fighting, hunger and destruction, the country was compelled to wage a bitter struggle against both internal counter-revolutionaries and bandits. After the tsarist government was overthrown in February 1917, the bourgeois Provisional Government freed criminals who banded together in armed gangs to terrorise the population and commit reprehensible crimes.

The gains of the revolution were defended by members of the All-Russia Extraordinary Commission and militia, whose criminal investigators were, in effect, former workers, peasants and soldiers lacking experience in fighting crime. And it was Soviet criminalistics, a science that emerged in the first years after the October Revolution, that was designed to help them in that struggle.

2. THE SUBJECT OF CRIMINALISTICS

Criminalistics plays an important role in investigating and solving problems related to fighting crime.

Like any other independent field of scientific knowledge, the subject of every legal science is essentially the regularities that determine the origin, state, developmental trends and changes in some specific group of phenomena, facts and relationships. The subject of criminalistics likewise involves a definite group of such objective regularities that are studied for subsequent use in combatting crime.

All crimes are committed in conditions of existing reality, are associated with the environment and reflected therein. No matter how fleeting the crime may be, it is never a one-time deed. It is, rather, a complex system of deeds and actions committed by the perpetrator before, during, and after the criminal deed. The deeds and actions of the victims, and also of other individuals who were intentionally or unintentionally drawn into the criminal event, should likewise be added to the above-mentioned deeds and actions. All these leave numerous traces of the criminal event that may subsequently become evidence in the case. These traces contain bits of information linked with the criminal event that make it possible for the inquiry, preliminary investigation and court to establish the objective truth in every concrete case.

Whereas any criminal event (like any event and/or phenomenon in general) is necessarily reflected in the environment, the information concerning a given crime is essential, recurring, stable and universal; in other words, it is an objective norm of reality. The regularities that "control" the process in which traces of a given crime appear include the following factors.

First: the recurrence of the process in which traces appear. For instance, when the hand touches a polished surface, fingerprints appear, and when someone walks over a dusty floor, footprints appear, and so on. In fact, no matter how many times these actions recur, the appearance of corresponding reflecting traces would recur an equal number of times in corresponding conditions and with the required regularity.

Second: the regularity in the relationship between the deeds of the criminal and the criminal result that arises as evidence in the case. This would signify that the criminal result proves the presence of a criminal deed and its character, and that the regularity of the given criminal result makes it possible to return to the event under investigation.

Third: the regularity of the relationship between the method by which the crime was perpetrated and the traces of that method. In other words, knowledge of the method by which the crime was committed allows one to surmise the traces that will inevitably appear.

Four: the dependence of the choice of the method for perpetrating the crime on concrete subjective and objective circumstances; the dependence that permits, proceeding from the method that serves as evidence, the establishment of those circumstances and, vice versa, the discovery of the method by which the crime was perpetrated according to those circumstances.

Finally, five: the regularities with which information on the crime disappears, i.e. those characterising the process whereby the trace reflections are eliminated.

Information about a given crime primarily comes from its traces, which may be either material or ideal. Material information is all that remains after the crime and is readily perceptible, e.g. the criminal's hand- and footprints, the victim's body, a broken safe, a bullet stuck in the wall, a blood drop on the sill of a broken window. Ideal traces are traces of events in people's minds, in the memory of those who committed the crime, of those against whom it was perpetrated, and of those who were eyewitnesses.

Naturally, ideal traces are imperceptible to the investigator, whereas material traces may normally be revealed, provided they are not microtraces or scents. However, one could uncover a scent and establish its source with the help of a police dog.

The possibility of using dogs to track people and animals was known long ago. In 1909, a police dog called Tref became widely known in Moscow for his unique sense of smell. In one case, he tracked three murderers for 115 km and finally caught up with them.

An equally famous police dog was Sultan, who served for fifteen years with the Leningrad militia. During that time, he helped arrest over two thousand persons and found stolen property worth more than two million roubles. During the Second World War, Sultan tracked several nazi saboteurs. Once, he took part in arresting a nazi parachutist who murdered several Soviet servicemen. After committing one of the murders, the nazi sought to escape on a highway with intense traffic. But Sultan caught

his scent from a Finnish dagger found at the scene of the crime and was able to track the criminal down.

Until just recently, police dogs could be used only if the tracks were fresh. In fact, if more than a few hours had passed after the crime was committed, the scent became either too weak for even the dog to sense, or disappeared altogether. In addition, modern cities make it increasingly difficult to track a man by his smell, because of the many interfering odours. Yet, even in such complex conditions, dogs occasionally are able to perform almost unbelievable feats. For example, once a police dog caught scent near a body found in a cemetery in the suburbs of Riga. He led his guide across the city all the way to the railway terminal and began barking at a man who was boarding the Moscow-Riga train. The man was so stunned that he instantly pleaded guilty.

In 1965, a group of Soviet crime experts headed by Professor A.I. Vinberg proposed an original and, at the same time, very simple method of preserving scent samples and scent-bearing objects taken on the spot. They called this method criminalistic odorology. Experiments have shown that the scent sample taken where an incident occurred would remain unchanged for several years, and could be used at any time when employing a police dog.

Under the law, traces of the crime and the criminal can be used as evidence in the case. In addition to the regularities that govern the occurrence of these traces, criminalistics also studies the regularities involved in work with evidence, i.e. its collection, examination, assessment and use in the course of proving guilt in crime.

Collection of evidence is a multi-stage process wherein:

(a) the said evidence is uncovered; various significant facts are brought to light;

(b) the said evidence is fixed (secured) as prescribed by law. In addition to imparting conclusive validity to the revealed facts, the fixation of evidence is designed to preserve it for subsequent investigation, assessment, and use;

(c) the said evidence is removed to ensure the possibility of using that evidence, to file it and to examine it (chiefly with reference to material evidence); and

(d) the said evidence is preserved, i.e. measures are taken to

preserve the evidence and its sources, and also to enable the investigator and court to use it.

Collecting evidence is essentially the first stage in the work with evidence in the course of investigating a crime. During this stage, the evidence needed to establish the truth is accumulated. Yet, in order for the evidence to be of use, it must be studied. Its examination is the second stage in the work.

Examination of evidence involves cognition by the inquirer, investigator, expert, procurator, or court of its nature; verification of the authenticity of the factual data that constitute its nature; and ascertainment of the fact that the given evidence is in agreement with all the other evidence in the case. This is, in fact, a distinctive process of "extracting" information contained in the evidence so as to try and understand it with reference to the tasks of the investigation. The collected and examined evidence must then be assessed by the inquirer, procurator, and court.

Assessment of evidence is a logical process whereby it must be established whether the evidence is logically possible and relevant, and whether and how its various aspects are interrelated. Assessment of evidence is also designed to determine the significance and ways of using the evidence to reveal the truth.

The collection, examination and assessment of evidence are inseparably linked and interrelated. Also, evidence must be examined and assessed when collected.

Finally, the *use of evidence* implies that evidence is to be used in the course of proving and establishing the truth, i.e. during the law-prescribed clarification of the entire scope of circumstances that, in their entirety, constitute the subject to be proved in a given criminal case.

The collection, examination, assessment and use of evidence are processes subordinate to their intrinsic regularities.

In criminalistics, the study of the regularities of certain criminal activities, of the regularities in the origination of information on a given crime, and of regularities in collecting, examining, assessing and using evidence are not ends in themselves. Criminalistics should know these regularities in order to fulfil its operative function, namely, to help fight crime by providing inquirers, investigators, experts, and courts with various techniques and methods for investigating and preventing crime.

In studying these regularities, criminalistics develops various techniques, tactics and recommendations that help process evidence, organise and plan preliminary and court investigation, and prevent crime. These methods, techniques and recommendations constitute the second element of the subject of criminalistics.

Criminalistics is a science dealing with the techniques and methods of revealing, investigating and preventing crime, and herein lies its main contribution to justice.

3. THE SYSTEM AND TASKS OF SOVIET CRIMINALISTICS

The following four areas are distinguished within the system of Soviet criminalistics.

The *general theory of criminalistics* explains its subject and tasks and methods of criminalistic research, and includes a number of specific criminalistic theories. It also determines the tasks, developmental trends and place of criminalistics within the overall system of scientific knowledge. All this constitutes the basis for developing and using investigation methods and techniques and for preventing crime. However, these techniques and methods vary in nature and essence. Grouping them by their common outward signs, formal role and essence, one can systematise and determine the contents of the other areas of Soviet criminalistics, namely, criminalistic techniques, criminalistic tactics and criminalistic methodology (the methodology applied in investigating specific crimes).

Criminalistic technology constitutes a system of scientific provisions that underlies the tools and methods for collecting, investigating and using evidence, and for taking other measures to reveal and prevent crime. The essence of these techniques and methods lies in the fact that they provide information from the applied and natural sciences, specifically to combat crime. The natural-science character of some of the tools and techniques gives the term "technology" a conventional meaning.

Criminalistic technology comprises *tools* that imply various apparatuses, instruments and materials; *techniques* of collecting evidence, e.g. for detecting barely visible fingerprints, for taking various traces, etc.; and *methodology for examining* evidence,

i.e. recommendations on the character and maintenance of the tools and methods used in different criminalistic investigations, including criminalistic examination.

The tools, techniques and methods of criminalistic technology may be classified into two groups. One group comprises tools, techniques and methods which, having been borrowed by criminalistics from other sciences, nonetheless remained unchanged. This concerns, for instance, cameras, enlargers, microscopes, magnifying glasses, tape measures, certain techniques for intensifying picture contrasts, measurement techniques, comparison techniques, certain methods of microscopic, X-ray, and other investigations, and so on; only the purpose of these tools, techniques and methods has come to be specific.

The other group includes tools, techniques and methods which, also being based on evidence from the applied and natural sciences, were specially developed for criminalistic investigations, e.g. corpse detecting device, criminalistic comparison device, device for establishing the genuineness of metal coins, etc.

The tools, techniques and methods used in combatting crime have been systematised depending on the branches of criminalistics in which they are used. These branches may be criminalistic photography, the study of tracks, criminalistic examination of documents, and so on.

Today, criminalistic technology is applied beyond the bounds of criminal court procedure. In fact, criminalistic tools, techniques and methods are employed in civil proceedings and administration, too. Again, specialists in literature and art, historians, ethnographers and representatives of other sciences also frequently ask specialists in criminalistic technology for assistance. For instance, methods used in the study of clues are successfully used to study the functions of primitive stone and bone implements by traces of wear on the working section. By these methods, and through many years of experimental simulation, archaeologists have not only revealed the production process for manufacturing Stone Age implements, but established the methods used in operating them.

As a result of experiments and comparison of the marks made with those on the ancient implements, interesting new evidence was obtained to radically disprove earlier concepts. Previously,

it was assumed that one or two generations would be needed to make one axe. However, experiments using the study of clues showed that primitive man took one or two days to make one axe, with which he could chop out a big boat in just ten days.

When applying criminalistic methods, archaeologists sometimes have to solve purely criminal problems relating to the remote past. For instance, in revealing an ancient burial ground in the Altai region in the USSR, scientists established that it had been plundered. But the exact date could be specified only after having established the way in which the barrier (wood) had been damaged and the precise implement used to do it.

Investigations at the Institute of Archaeology, USSR Academy of Sciences, showed that the site was plundered within the same historical period when the burial ground itself was dug. The wood was slashed in the same manner and with the same implements that existed at the time of the burial.

Thus, just as criminalistics uses information from other sciences, so do other sciences use methods of criminalistics.

Criminalistic tactics is a system of scientific provisions and recommendations developed thereupon for organising and planning preliminary and court investigation, and for determining the line of behaviour of persons performing court examinations and techniques of specific procedural actions aimed at collecting and examining evidence to establish the causes and conditions conducive to committing or concealing crimes.

To execute every procedural deed, criminalistic tactics develops a whole set of tactical techniques, whose system forms the tactics of a given procedural action, namely the tactics of the inquiry examination, search, investigation experiment, and so on.

Criminalistic technology and criminalistic tactics are inseparably linked and interrelated. Tactical devices and recommendations ensure the fullest and most effective use of criminalistic techniques and tools in the course of preliminary and court investigation of criminal cases. Individual tactical devices and the whole tactics of a given procedural action change depending on the nature of the criminalistic tools used. In turn, the use in criminalistic tactics of data from such sciences as logic, psychology, the theory of games, etc., causes either the appearance of new criminalistic tools, techniques and recommendations, or changes in existing ones.

In the practical activities of inquiry, investigation, and court bodies, criminalistic technology and tactics are realised through criminalistic methodology.

Criminalistic methodology is a system of scientific provisions and methodological instructions and recommendations developed for investigating and preventing murders, thefts, robberies, speculation, graft and other kinds of crime.

It is this section of criminalistics that takes into account the specifics characterising the application of the provisions of criminalistic technology and tactics in investigating and preventing a given kind of crime. For instance, in developing tactical devices for examining the site of the crime, criminalistic tactics gives only general instructions for investigative action. Yet it is quite clear that the tactics of inspecting the site of a theft essentially differ from that of inspecting the site of a murder; and both these tactics differ from that used in inspecting a traffic accident. In fact, it is criminalistic methodology that takes into account the specific features assumed by the general provisions of the tactics of some procedural action, depending on what kind of crime is to be investigated.

Both the general theory of Soviet criminalistics and its technology, tactics and criminalistic methodology are essentially aimed at solving the tasks that face criminalistics as a whole.

In the socialist society, crime can be totally eradicated. In fact, this is the principal and common task of all the sciences that study the various aspects of combatting crime, including criminalistics. This common task gives rise to special tasks characteristic of every given science and reflecting its specifics. The special tasks of Soviet criminalistics are:

(a) to develop new and improve existing criminalistic tools, techniques, and recommendations for collecting, investigating and using evidence;

(b) to develop and improve the organisational, tactical and methodological foundations of preliminary and court investigation; and

(c) to develop and improve the criminalistic tools, techniques and methods for preventing crime.

In addition, a major task of Soviet criminalistics is to expose the reactionary nature of bourgeois criminalistics and its shame-

ful role in fighting revolutionary and national liberation movements.

To solve its special tasks, Soviet criminalistics makes extensive use of the achievements of other fields of knowledge, e.g. philosophy, logic, psychology, chemistry, physics, mathematics, biology, etc. In creatively using the achievements of other sciences, Soviet crime experts devise new technical means and tactics for handling evidence and improve methods for investigating and preventing crime.

The fact that the formal function of criminalistics is to meet the practical needs of combatting crime signifies that the development of criminalistic recommendations essentially arises from those needs, and that their expediency and efficacy are to be verified in practice. Hence, criminalistics studies investigatory and court practice, and the practice of examination of evidence by experts; examines all pertinent innovative and progressive techniques; determines the needs of practice; and analyses errors and shortcomings in investigating crime. At the same time, the further development of criminalistics and the improvement of its recommendations for practical work help enhance the standards of that work.

The study of questions relating to the prevention of crime is not the monopoly of Soviet criminalistics, whose task is merely to devise criminalistic tools and techniques for crime prevention that may be divided into tools and techniques for establishing the causes and conditions conducive to the perpetration and concealment of crimes; the tools and techniques for obtaining information on planned crimes; and the tools and techniques for protecting people and property from criminal attempts.

It has long been held that the sphere of criminalistics is restricted to preliminary investigation. Yet, practice has shown that in legal proceedings the court, too, not only can but must use criminalistic tools and techniques in handling evidence. In this case, the specifics of court investigation are such as to demand that questions relating to the use of criminalistic data be specially worked out, and Soviet criminalists are conducting relevant research.

Essentially, the sphere of application and tasks of Soviet criminalistics link the science with a number of other legal sciences and special fields of other branches of scientific knowledge.

4. CRIMINALISTICS WITHIN THE SYSTEM OF SCIENTIFIC KNOWLEDGE

Criminalistics is a legal science and, like all legal sciences, is very closely linked with *Marxist-Leninist philosophy,* whose tenets provide the crime expert with a knowledge of the general categories and laws constituting the methodological foundation of criminalistics. In fact, the subject of criminalistics is formulated on the basis of contemporary philosophical concepts of the subject of some concrete science. The dialectical method permits the disclosure of the philosophical essence of criminalistic problems and serves as a foundation for all the other methods of criminalistics.

As a science that studies problems of combatting crime, criminalistics is most closely linked with the legal sciences of the same "criminal" group, i.e., *criminology, forensic statistics, criminal law* and *criminal court proceedings.*

Criminology studies the regularities that determine the state, dynamics, forms and causes of crime, and measures for preventing the latter. As a special branch of social statistics, forensic statistics studies the quantitative expression of regularities determining the state and dynamics of crime and convictions, and also the figures characterising measures for combatting crime. Forensic statistics links the study of the quantitative characteristics with their qualitative significance in concrete places and times. The relationship of these sciences with criminalistics consists in the fact that, in the final analysis, they reflect the efficacy of the provisions of criminalistics used in practice, and the tools and methods of court investigation and crime prevention developed thereby. In turn, criminalistics takes into account and uses the data provided by criminology and forensic statistics. This is done to assess the efficiency of its practical recommendations and to determine the trends of activity in those crime-fighting organisations most in need of receiving suitable criminalistic counsel and new criminalistic tools and methods that would be conducive to intensifying their struggle precisely in those directions.

Criminalistics and criminal law are very closely linked. Without having determined the nature of the crime, one cannot develop relevant investigation methods. For, prior to deciding

in what way to establish the criminal event, one must know what event should be established and what are its elements and signs; in other words, one must know the nature of the crime in question.

The relationship between criminalistics and the law of criminal procedure is diverse and direct. The links are of a historical nature, for criminalistics, as a field of scientific knowledge, emerged and first developed within the framework of the law of criminal procedure.

Though originating in the law of criminal procedure, the elements of criminalistic knowledge were increasingly drawing away from their "mother" science as they became more developed and complicated. Finally, when they were more unlike than alike, a new science naturally evolved—criminalistics.

The law of criminal procedure determines the limits and conditions for applying criminalistic recommendations in forensic investigation; the competence of different participants in employing criminalistic tools, techniques and methods; and the subject to be proved. All these provisions are, in effect, starting-points for criminalistics.

Criminalistics also has many contiguous points with forensic psychology, which is actively used in developing criminalistic tactics and investigation methods.

Criminalistics is likewise connected in many respects with such special branches of knowledge as forensic chemistry, forensic medicine and forensic psychiatry. All of these have the common purpose of combatting crime, and also, in many cases, common investigation subjects and common and mutually supplementing investigation tools and techniques. Yet, the fact that these sciences are close to criminalistics offers no basis for maintaining, as some criminalists outside the USSR would do, that forensic chemistry, forensic medicine, and forensic psychiatry are component parts of criminalistics. All three are branches of the natural sciences, whereas criminalistics is a legal science with a different subject.

That criminalistics is a legal science is substantiated by the following factors:

1. The subject of criminalistics and the objects that it studies lie within the sphere of legal phenomena.

2. The official function of criminalistics and the tasks it re-

solves relate to the legal activity of state bodies, to legal processes (investigation and court examination).

3. All practical recommendations developed by criminalistics are of a strictly legal nature, based on law and correspond to its spirit and letter; they are called necessary to eliminate crime in the USSR, and are being developed with the sole purpose of providing scientific aid to investigation and court agencies in revealing the truth.

4. Criminalistics is connected with many other social, natural and applied sciences; yet, these links are chiefly local in character, whereas its principal "culture medium" is law, the legal sciences and investigation, court and expert practice. Historically, criminalistics came into being precisely within the framework of the law of criminal procedure, which is, in effect, a legal science.

Contrary to the views of Soviet lawyers, bourgeois legal experts either do not regard criminalistics as an independent science at all, and use the term to designate an eclectic combination of the so-called "forensic sciences" (individual chapters of the natural and applied sciences used to investigate material evidence) or consider it as a purely applied discipline for the police.

5. THE METHODS OF CRIMINALISTICS

Like any other science, criminalistics resolves its tasks by using specific methods of scientific investigation.

In the broad sense of the word, a method is an approach to reality, a way of cognising, studying and investigating natural and social phenomena, a way to achieve some objective, solve a problem, in short, "a path . . . of real cognition".*

Actual cognition is, in fact, a transition from ignorance to incomplete knowledge, and then to more complete knowledge; it is a process of continuous aspiration for the truth. Indeed, any process of cognition, regardless of what sphere of human activity it may take place in, is subordinate to the most general laws of cognition, to the laws of materialist dialectics that

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* V. I. Lenin, *Collected Works,* Vol. 38, Progress Publishers, Moscow, 1976, p. 88.

express the most general and substantial associations and relations of objective reality. Whereas the laws of materialist dialectics are of universal significance and inherent in any form of motion of all matter, including that in nature, society and thinking, the Marxist dialectic method is the sole *universal* method of cognition, equally applicable to all varieties of cognition both in science and practice. Hence, it is with good reason that one can say that *the universal method of criminalistics is the dialectic method.*

The major significance of the dialectic method both for criminalistics and other sciences lies in the fact that it is the *fundamental* method of any science, i.e., one upon which all the other methods used in studying and mastering the subject of a given science and its individual facts and phenomena are essentially based and stem from.

In no way, however, does recognition of the universal significance of Marxist dialectics exclude other scientific methods of cognition. Dialectical materialism is the sole *universal* method of cognition, but not the sole scientific method. Just as dialectic materialism cannot replace individual branches of knowledge, neither can the dialectic method replace the methods of those branches of knowledge or methods applied in different spheres of practical human activity.

In expressing the general, methodological principles of the process of cognition, and without substituting special instruments of research, the dialectic method makes it possible to construct a general system of methods for a given science or a given variety of practical activity and to be itself a component part in this system as an underlying element. The two other elements of this system are the general (or common-to-all-sciences) and special methods of scientific investigation.

The *general* (or common-to-all-sciences) method of investigation should be understood as a system of definite techniques, rules and recommendations for studying specific objects, phenomena and facts.

The general methods of cognition are as follows: (a) observation; (b) measurement and calculation; (c) description; (d) comparison; (e) experimentation; and (f) simulation. Depending on the specifics of a given variety of cognition, these general methods assume certain characteristic features. This gives rise

methods, and, finally, to methods of criminalistics and those for to historical, chemical, astrophysical and other investigation proving the truth. Depending on the variety of a given process of cognition, the specificity of general methods is caused by such facts as the object of cognition, the conditions in which cognition occurs and the technical means used by the investigator. Hence, it is quite clear that observation of astronomical events, for instance, would differ from observation of the actions of participants in an investigation experiment. Similarly, the measurement of radioactivity would differ from the measurement of distances between objects at the site of the event, albeit the essence of observation and measurement would in all cases remain the same.

Without differing *in essence* from the general methods of investigation in other sciences, the general methods of criminalistics nonetheless have certain specific features determined by the character of the regularities that constitute the subject of criminalistics, by its objectives, and the nature of the fight against crime, i.e., of a special form of human practice which relies on the recommendations of criminalistic science.

A *special* method of investigation should be understood as one that is applied only in one or several (but not all) areas of cognition, and whose sphere of application therefore has no such universal character as that in which any of the general methods is applied.

Special methods of criminalistics include chiefly those which, having appeared in other branches of knowledge, were then also applied in criminalistics, e.g. the stochastic method; or those which, conversely, having appeared in criminalistics, were then used in other fields of research, e.g. the colour separation method.

Apart from these, special methods of criminalistics include those that are characteristic solely of criminalistics and are not applied in other sciences (for example, the method of typifying the identity of a probable criminal, methods of identifying subjects by their handwriting, and so on).

Special criminalistic methods also differ in their sphere of application. Some are used only in one branch of criminalistics, for instance, only in criminalistic technology, while others are applied in two or all three of its fields. The scope of special cri-

minalistic methods is continually expanding, both through the development of new research methods by criminalists themselves and through the use of new special methods applied in other sciences.

One should distinguish the methods of criminalistics as a science from methods of practical activity based on the provisions of criminalistics, for example, from the process of collecting, investigating and assessing evidence. The practical activity of inquirers, investigators, court officials and specialised institutions is theoretically based on a number of sciences, including criminalistics, but it differs from scientific investigation with regard to content, objectives, means and conditions. Similar methods of cognition, whose gnoseological essence remains the same irrespective of their sphere of application, may be used both in practical activity and in criminalistic research. For instance, in both cases, observation would represent planned, purposeful, intentional perception, and its essence would not change, regardless of whether it would be performed by an investigator or a criminalist. Yet the conditions in which this method of cognition is applied, the subject of observation and the purpose of observation would in both cases differ, and this could not but affect observation techniques, the role of observation in the process of cognition and the authenticity of its results.

The difference between scientific investigation and practical methods for investigating criminal cases and court examination becomes even more pronounced when special, not general, methods of cognition are applied. A number of special criminalistic methods may prove altogether inapplicable in collecting, investigating and assessing evidence, both in virtue of their essence *per se* and because of legal restrictions concerning the use of certain means of collecting and investigating evidence to prove a case.

Like any other science, the efficacy of any investigation methods in criminalistics is determined by practice. When proving a case in practice, we check the viability and correctness of criminalistic recommendations, techniques, tools and methods. In this case, practice serves as a collective indicator in combatting crime by investigation agencies, the procurator's office, the court and various specialised institutions; as the personal professional and life experience of a given investigator, judge and/or

expert; and as the sum total of the experience of operatives, investigators, judges and experts in other fields of science. A sign of the future successful development of criminalistics as a science is the fact that its tenets are being verified in practice, and its main objective, to help combat crime, has been achieved.

In criminalistics both the universal method of cognition and the individual and special methods based thereupon act in dialectical unity and are correlated. In fact, all together they form the essence of the *method of criminalistics,* a concept clearly integrated and structurally complex.

Chapter 2

IDENTIFICATION, DIAGNOSTICS AND CRIMINALISTIC EXAMINATION

1. WHY THE NEED FOR CRIMINALISTIC IDENTIFICATION AND HOW IS IT POSSIBLE?

In investigating various offences, there is frequent need to establish the relationship between some person or thing and the event in question by examining traces of the crime.

In one Siberian town, over ten burglaries were committed in half a year. Fingerprints were detected at the site of the crime which helped to identify the culprit.

Another example. Three young men wearing black masks made from the tops of women's stockings broke into a shop when only one guard was present. The latter fired at them, and they fled. However, they left a rope with which they wanted to tie him. Also, the guard managed to strip one of the criminals of his mask. Later, the police discovered in the suspects' residence the lower parts of women's stockings and a piece of rope which fully matched the end they had left in the shop.

One more example. The body of a raped woman was found in the graveyard of a small town on the Volga. Footprints were distinctly visible alongside the victim, and there was also an empty Pepsi Cola bottle and cork lying around. The bottle had a clear fingerprint, and the cork—toothmarks. In this way, the suspect was exposed.

Also, traffic police search for some vehicle by its tracks; criminal investigators identify the pistol from which a bullet was fired by marks on the bullet or cartridge case; and experts are able to help determine who wrote something by examining the handwriting.

In all the above-mentioned and similar cases, the main objective is to identify* the object by its reflection results. Moreover,

* From the Latin *"identificare"*. The term "criminalistic identification" is used in three meanings, namely to designate (a) the purpose

both the *object* and its *reflection* are interpreted in quite a broad sense. The object is understood to be a person, items of his clothing and footwear, his criminal tools, motor vehicles, weapons, implements and the like. Reflections may be various traces, documents, photo- and movie pictures, parts or fragments of things and mental images retained in the memory.

To identify an object means to establish its identity with itself in various periods of time or state, using therefore the reflections left behind.

Every object of the material world is in itself unique, with an identity all its own and characterised by a definite entity of marks, which makes it basically possible to identify it. Yet this requires that the traces left by the object or its other reflections imprint the features that individualise it, distinguishing it from among similar ones.

Criminalistic identification is one of the means for establishing the truth in criminal procedure. In fact, this is what makes it different from identification in other sciences, such as botany, zoology, geology and engineering. The distinctive feature of criminalistic identification is that its final objective is to identify a specific object, not its genus, species and/or class.

The theory of criminalistic identification provides concepts of identity and distinction to show how the object displays its individuality; it also develops the study of marks as indicators of the properties of a given item, and outlines the principles and techniques of analysing identification marks.

All crimes are perpetrated in a material environment. Hence, the criminal's actions and the effect of criminal tools and other items are reflected in the environment. To successfully identify all these, one must know and take into account the conditions in which the subject in question was reflected, and the way in which its identification marks were transmitted. Identification itself helps to establish only the mere fact of interaction of people or things with the environment, and it still remains to be proved that the afore-mentioned actions are connected with the event under investigation.

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and result of the investigation; (b) the process of investigation; and (c) the method of cognition, i.e., the theoretical conception, the theory of criminalistic identification.

In regarding identification as a method for studying the interaction of material objects in the course of a criminal action, one obtains evidence on the technical aspect of this interaction to clarify by what object and in what conditions were the marks left, and whether they belonged to a given object. The revealed fact of physical interaction is further assessed in correlation with other circumstances figuring in the case. Only in this way can its pertinence to the subject to be proved be established and a legal assessment of the fact of interaction given.

Identification may concern facts relating to any of the elements of a crime, but chiefly to the object, objective aspect, and subject. For instance, analysis and identification of traces revealed at the site of the offence make it possible to judge the direction of the criminal attempt, e.g., safe breaking, homicide or theft of material goods. The significance of identification is especially important in determining the manner in which the crime was committed, i.e., the objective aspect of the offence. In this case, the concrete tool used for that offence is identified and conditions revealed under which it had left its marks (e.g., manner and direction of burglary, etc.). Identification makes it possible to establish the subject of the crime by traces left by parts of the human body, i.e., hands, feet and/or teeth; by marks left by items belonging to the suspect, e.g., footwear, gloves, etc.; and by other objects.

However, the fact of identification *per se,* taken in isolation from other factors, cannot prove that an offence has been perpetrated by a specific person. It remains to be shown that the traces appeared in connection with the crime, not before or after, and this can be done only by analysing the entity of all the interrelated facts involved.

2. TYPES AND FORMS OF IDENTIFICATION

Identification is distinguished by materially-recorded and psychophysiological reflections. The former are understood to be the objective fixation of the signs of the object in question, e.g., handmarks, footprints and traces of weapons, vehicles, and other similar items; photographic pictures (movie reels and video tapes) of people, corpses, material evidence, localities, etc.; descriptions, including files, and other forms of establishing facts.

Psychophysiological reflection is essentially the mental image of an object imprinted in the memory of a specific person. For instance, a witness saw the actual criminal and remembered his outer appearance. Naturally, only a person who has retained that image in his memory could identify someone or something by a mental image and that person could be the witness, the victim, or the accused.

In contrast to this, identification by materially-recorded reflections could be performed by experts, investigators, and/or judges. In this case, the scope of investigations and the significance of their results would differ depending on the procedural status of the above-mentioned persons. Not infrequently, both types of identification are used to convict criminals.

Here is an example from the pre-revolutionary past. The last Russian tzar, Nicholas II, liked to play the violin. According to his contemporaries, he was only a mediocre violinist; but the important thing was that he played an instrument made by the great Antonio Stradivari. The invaluable violin was a gift from the king of Italy, and Nicholas II kept it in a special room and special case. Still, someone managed to steal it. One of the versions would have it that the thief smuggled it out of the country, and soon Prefect of the Police in Paris informed St. Petersburg that the tzar's violin was discovered in a curiosity shop. The owner explained that a young lady called Mikhailova had sold him the instrument and that, in conformity with existing regulations, had signed a receipt stating she was selling one of her personal belongings. Naturally, the police failed to locate Mikhailova at the place indicated in the receipt as her residence.

By that time, the Russian police had made up a list of all the courtiers who had access to the room where the tzar used to keep the violin, and among them was the tzarina's lady-in-waiting, Princess S.A. Gagarina, a member of the old Russian nobility who, on the eve of the theft, was in the tzarina's chambers. Two days later, she left for Paris with her maid Fedorova. According to the shopkeeper's description, the woman who sold the violin and called herself Mikhailova resembled Fedorova very much, and when the police showed him Fedorova, he identified her as such. However, Fedorova flatly denied everything and insisted she had never seen the shopkeeper before.

Then the receipt signed by the imaginary Mikhailova was subjected to criminalistic examination. The examiners were categorical in their conclusion that the paper had been signed by Fedorova. Thus, identification by her mental image was supplemented by identification of her handwriting. It remains to be added that after the exposure of the princess—the tzarina's lady-in-waiting—prosecution was dropped by "imperial command".

Identification may be performed in *procedural* and *non-procedural* form. In the former case, it is achieved by expert examination or during some investigatory action (submission for identification, inspection or search). The results of identification, as reflected in the resolution of experts or in the protocol on submission for identification, assume the significance of evidence. If identification is performed by the investigator in the course of inspection, search or removal, its results have no evidential significance; however, they are used to obtain other evidence. For instance, having established that a bullet was fired from a Browning pistol, the investigator would take measures to find this type of weapon; again, if when conducting a search the investigator detects an item whose distinctive marks are known to him, he would remove it.

Objects examined during identification are classified into identified and identifying ones. The former are those to be identified, and the latter—those used as means to identify other objects. The objects to be identified are people (the accused, suspects and/or victims), animals, various material items, (criminal tools, firearms, cold steel and motor vehicles), localities, buildings and structures.

Depending on the way the reflection occurs, the following are examined as identifying objects (i.e., direct objects of investigation): human handmarks, footmarks and toothmarks; marks from parts of human clothing and footwear; and so on. For example, when a car knocks down a pedestrian, its coat of paint may retain imprints of the fabric of which the victim's clothing was made. When such a car is discovered, the traffic police will thus identify corresponding sections of the clothing.

Identifying objects are marks from firearm parts that appear on fired bullets and cartridge cases. It is also possible to identify wheel or caterpillar tracks or marks left by the projecting parts

TYPES OF CRIMINALISTIC IDENTIFICATION

Identified objects	HUMAN BEING			Typewriter	Tools	Weapons	Motor vehicles	"Parts of whole"	Substances
Identifying objects	Appearance marks (their shape, size, location, colour)	Habit systems	Trace-reflections	Reflection of typewriter's marks / Reflection of writing habits	Traces from working facets of tools and production machinery	Traces on bullet / Traces on cartridge case	Traces of vehicles a) undercarriage traces b) traces formed by protecting elements	Part, fragment	Chemical structure
			Finger-prints					For example: torn sheet of paper	Physical properties
Methods of comparative analysis	Comparison of shape and location of ear elements	Comparison of marks of direction of movement, and beginnings and endings of letter elements	Comparison of papillary pattern specific marks	Comparison of common and specific marks			Comparison of specific marks (technological and operational)		Physical and chemical research methods
Ways of reflecting marks	a) photograph b) description c) drawing d) mental image	a) text examined b) control samples (free and experimental)	a) trace b) control imprint c) dactyloscopic chart	a) text examined b) control samples (free and experimental)	a) object examined b) control samples c) including mass production items	a) fired bullet (cartridge case) b) control samples c) items from bullet and cartridge case collections	a) trace-reflections b) control traces	a) parts of solid whole b) set and its elements c) chaotic systems d) mass production items	a) substances b) samples c) reference data
Type of investigation	Identifying a person by his (her) appearance marks	Forensic expert examination of handwriting	Dactyloscopic expert examination	Technical expert examination of documents	Mechanoscopic expert examination	Forensic ballistic expert examination	Expert examination of transport clues	Expert examination for "establishing the whole by its part"	Forensic examination of materials

Fig. 1. Types of criminalistic identification.

of vehicles. In one case, tread marks were discovered on the clothing of a pedestrian knocked down by a car. By the tread pattern, the police could establish the model of the pneumatic tyre and determine what types of cars use them. With this information, the wanted car and its owner were readily found.

Quite often, identification is performed by the marks of implements and tools, specifically those used for breaking barriers and/or storehouses. In one instance, criminals forced a safe by drilling holes with an electric drill. Most of them were drilled all the way through; however, some were not drilled to the end and had bases with marks in the form of concentric circles. These marks were used to identify the drill confiscated from one of the criminals.

Inasmuch as the removal of tools and subsequent examination of the marks on them is not always possible for technical reasons, the investigator makes and examines the models of the marks in the form of casts, impressions, imprints, and photographic pictures.

Documents (identifying objects) are also used as means of identification. For instance, an investigator had to establish by the seal impression on an institute graduation diploma whether the seal was genuine or forged. Having examined and compared the impression with those of the genuine seal, experts found them to differ. After the suspect was found to be in possession of the fake seal, it was proven that he was selling forged diplomas.

Handwritten documents (letters, notes and/or rough copies) are examined to identify a person by his or her handwriting; typewritten or typeset documents make it possible to identify a given typewriter or types of point (see Fig. 1).

Localities, buildings and structures may be identified both by actual demonstration and on photographic pictures. In one instance, a criminal caught in an attempt of burglary admitted that he had previously repeatedly committed such crimes. He did not remember the addresses of the burgled flats, but agreed to show by memory the houses and flats which he entered in the absence of their occupants. Following numerous rounds of the town, he identified by mental image several flats whose occupants confirmed that they had been burgled.

The data of criminalistic records may also be used as objects

of examination during identification. In the USSR, these are files of fingerprints belonging to persons previously convicted for crimes. In one case, a jewelry shop burglar left marks of the fourth, third and second fingers of his left hand on the glass showcase of the counter. A dactyloscopic chart with all P.'s fingerprints was found in the file of former criminals after all possible versions of corresponding dactyloscopic formulae* were drawn up. A subsequent comparison of the fingerprints from the site of the crime with those of P. made it possible to identify him as the perpetrator of the burglary.

So-called "identification of the whole by its parts" is essentially a variety of individual criminalistic identification. In such cases, the investigator determines whether or not the parts of divided objects previously constituted a single whole. For instance, he tries to establish whether the headlight fragments found where a pedestrian was hit by a car and those found on inspecting the said car were once a single whole. Or, whether a knife edge fragment stuck in the bone of a victim and a knife with a broken edge found on the suspect belonged to the same weapon. In solving such problems, the investigator puts together the parts (splinters, fragments, scraps of paper, etc.). The concept of a whole object with regard to solving identification problems is given a broad interpretation in criminalistics. The concept of an identified whole embraces the following categories of objects:

(a) monolithically structured items of inorganic origin (various manufactured items, half-finished articles, etc.);

(b) biological objects (plants, pieces of wood, etc.);

(c) mechanisms and aggregates comprising interacting parts;

(d) material components and complexes of things that constitute single-purpose objects, e.g. dagger and sheath, jacket and trousers, eyeglasses and case, etc.;

(e) chaotic systems, e.g. fluids and dry substances without stable form.

The separation of a whole into parts, e.g. loss of a shoe heel at the site of a crime, may occur both during and prior to the criminal event. For instance, a page from a school notebook which had been used to wad a firearm was found at the site of

* See Chapter 7.

a murder. Judging by the text of the notes on the wad, the notebook possibly belonged to a fifth-form pupil. The investigator finally identified the suspect, who lived in a family with such a pupil. During a subsequent search, they found a notebook with a piece torn from one of the pages. On identifying the whole by the part, they established that the line where the page was torn coincided with that of the torn-away piece used for making the wad.

In any such case, by establishing the single whole through identification methods and techniques one can discover a relationship between the perpetrated action and the fact of division of the whole into parts, i.e., the interdependence of different, but interconnected events; the implication of a given person in the said action; and so on.

In addition to establishing individual identity, criminalistics also widely practices group identification or the establishing of a group affiliation of an object. Such investigation makes it possible to show that the object in question belongs to a specific class, genus, and species, i.e., to a certain multitude of homogeneous objects. In this case, homogeneous objects are understood to be those that, despite all their distinctions, possess the same set of marks, for instance pistols of the same calibre, system and model. Homogeneous objects differ from those that are merely similar. Similar objects are understood to be those that merely possess certain identical marks but are not equivalent (interchangeable). The term "group" is a collective notion for a given category of homogeneous objects.

The fact that the object belongs to a definite group is established by examining its marks and comparing them with those of other objects from this group. Let us suppose an investigator discovered a bullet fired from some sort of weapon. After examining its shape, size and design and the traces that appeared when the bullet passed through the bore, he could establish the system (model) of the firearm used. In this case, this would be the act of establishing the group to which the latter belongs. The next step might be individual identification of the weapon, provided the latter is uncovered. In the absence of the firearm, identification would end merely by establishing the group to which it belongs.

Sometimes the investigator has to restrict himself to merely

establishing the group to which an object belongs, because the trace-reflections lack the marks that could individualise or distinguish it from a group of similar objects. For instance, by the tracks of a motor vehicle, one could establish a car model (group of similar automobiles to which it belongs). However, if there were no characteristic details in the tracks, it would be impossible to identify that car in this way, even if it were discovered later.

Both categories of existing classification systems and those not predetermined by any system could figure as groups. For example, in classifying implements and tools, one could distinguish striking, stabbing, cutting, and other groups, and with regard to motor vehicles—various car models. Classification groups could be narrowed when additional marks are available. In further expanding the above-mentioned example with the fired bullet, by which one could establish the system of the firearm used, we shall mention one more mark. Let us assume that the traces on the lateral surface of the bullet testify that the bore through which the bullet passed had significant wear, i.e., the weapon was quite old. In this case, the group would not comprise any firearms of the given system, but only the weapon which has a worn bore. We can similarly speak of an arbitrarily formed group, including, for instance, "size 9 shoes with characteristic marks of sole repair", and so on.

The creation of such groups on the basis of their arbitrary marks is highly significant, for it helps to narrow the scope of a given group to facilitate the search of a given object. Having discovered an object possessing the required sum of marks, the investigator would establish its relationship with the investigated event. The greater the number of group marks, the more probable that relationship. This conclusion is essentially based on the fact that as the number of marks underlying a given classification increases, the number of the group's component objects invariably decreases until individual identification is made. However, when the latter is unfeasible because of objective reasons (absence of characteristic marks), the investigator has to restrict himself to inferring that the object belongs to a given group, and strive to maximally limit its scope. An instance of this would be: "Wanted: a Lada 1500 yellow car with broken right headlight and crumpled right front wing."

An action converse to identification is *differentiation*. Like identification, differentiation is concerned with examining objects by distinguishing or identifying them by their mental image or with their identification (by some materially-recorded reflection) by experts. Yet, whereas identification signifies the establishment of identity, differentiation establishes a difference.

To a greater or lesser extent differences always exist. Depending on their nature and qualitative and quantitative manifestations, and on their share in the final result of comparative examination, one could arrive at one of the following three possible conclusions, namely that there is identity, that there is no identity, or that the given problem is insoluble. If the differences are substantial, and dissimilarity has been established in the main, the result of the investigation would be the act of differentiation. However, if the nature of the differences in question is vague and the investigator has failed to determine whether they are substantial or not, he or she would be compelled to state that the problem cannot be solved.

3. THE MAIN THING IN IDENTIFICATION IS THE STUDY OF MARKS

Despite the fact that identification and distinction are two different and mutually exclusive means of arriving at conclusions, the investigation leading thereto is the same, namely, the objective study and comparison of the properties of the objects compared. The properties of objects are reflected in the totality of marks capable of characterising them in a definite way. Hence, the theory of criminalistic identification stresses the interpreting and classifying of marks, and the notion of the identification mark.

For identification purposes, the investigator selects a set of marks that provide a sufficiently accurate idea of the object and distinguish it from similar objects. Marks of the object's outer structure characterising its form, size, surface, etc., could serve to identify it. Again, marks that reflect the object's intrinsic properties, e.g., chemical composition, density, hardness, electric conductivity, etc., could also be used for identification.

Identification marks could likewise be transformed reflections of the properties of the object being identified. For instance, iden-

tification of a person by his handwriting represents identification by marks found in a handwritten text and reflecting the conditioned reflex pattern of the given individual.

A Swedish criminalistic journal reported a case where someone was identified by a solved crossword puzzle. A cardboard box with the body of a newborn baby that had been chewed by animals was found in a forest. The body was wrapped in a newspaper containing a scrap of a crossword puzzle. The guessed words were accurately written in block letters. The place left for the contestant's name was also filled in with block letters; however, only the two last letters, E and L, remained.

In the course of an inquest, the officials discovered among the female students of a nearby educational institution a woman whose second name ended in EL. A scrutiny of her handwriting showed that she was the one to have filled in the crossword puzzle. During a subsequent interrogation, the detained woman pleaded guilty to the crime. In fact, the body of the baby was that of her illegitimate child.

For a mark to serve as an identifier, it must meet a number of requirements. It is particularly important that it be substantial, specific and original, which means it should fully reflect the identifying properties of the object in question and be untypical, i.e., differ from the average characteristics and norms. A mark's specificity may concern an object's properties that are not chiefly inherent in it, but could distinguish it from a series of similar objects. For example, at the site of a fire in a Finnish village, numerous footprints of the villagefolk who had rushed to the burning house were revealed. Not far away from the site, more footprints were found in a freshly-dug vegetable plot and field adjoining the house. All the prints from the right shoe were found to show a specific sole and heel pattern. These marks indicated that the prints were left by army boots used by the Finns during the Second World War. Given this, it remained to reveal the males who were still in possession of such boots and then search for the suspect among them.

Since in the identification process the investigator most frequently has to deal with an analysis of the reflection of marks (in the trace, copy and/or model), an important prerequisite is the clarity of a given mark and its ability to perpetually and stably reflect a given object. In fact, it must be reproducible in every

case of trace formation, and its reflection must be adequate to the object itself, i.e., unambiguously convey information about its properties.

Identification marks must be relatively stable. However, all objects in the material world perpetually change in one degree or another. Speaking of the relative stability of identification marks, we imply that inevitably occurring changes either concern not all the object's properties and marks or are highly insignificant and may hence be disregarded. The theory of criminalistic identification includes the concept of "identification period", i.e., the period that elapsed from the moment when the object was reflected (through formation of a trace) to the moment when that object was identified by that trace. The investigator studies the marks that proved to be unchanged during that period. The preservation of these marks cannot be predetermined by given time lengths, since the variability (and stability) of marks is dependent on external factors, e.g., storage and utilisation conditions and intentional changing of the external properties of a given object.

Aware of the substantial significance of identification marks, criminals often take measures to modify them. Yet, in doing so, they forget that the weapon can be identified even in its absence; for instance, slash marks reveal that an axe was used. For the first time, experts examined such slash marks in Canada in connection with illegal timber felling. Marks on felled trees helped to identify an axe that was taken from the person suspected of misappropriating timber. In another case, the criminal took effective measures to change the axe marks, but was nonetheless exposed. Having murdered a woman and buried her in the forest, he covered the fresh grave with tree branches he had chopped off with an axe. On returning home, he rewhetted it to change the marks of the working element. But during the search of his yard they found stakes the man had chopped down prior to rewhetting his axe. A comparison of the marks on the stakes with those on the branches found at the site of the crime proved they had been chopped down by the same axe, and its owner finally had to plead guilty.

Identification marks may be classified in different ways. Experts in criminalistics divide them into the *common* and *specific*. Common marks are inherent in homogeneous objects, i.e., they

manifest the most common features and properties of a group of objects. These are marks of form, size, colour, purpose and so on. Specific marks are those which make it possible to distinguish an object from a group of homogeneous objects. As a rule, specific marks are those which represent the details of an object. Yet, a specific mark is in itself insufficient to individualise an object. It may also recur in other homogeneous objects due to either chance or natural (law-governed) causes. Only the sum total (complex) of specific marks, termed in criminalistics as *specific totality,* can individualise an object to distinguish it from other homogeneous objects.

For every type of criminalistic object (human tracks, traces from burglar's tools, weapons, handwriting, etc.), categories of common and specific marks have been worked out and general criteria established to determine the totality of specific marks used for identifying the given type of object.

The nature of specific marks may vary. They could represent details of living matter, e.g., specific marks of the human finger pattern, or they could occur when the object is being manufactured or utilised (like, say, the uneven microscopic relief in the bore of a firearm). Specific marks are divided into *outward* and *inward* categories. Outward marks include colour, form, dimensions and relief details, and inward marks—the object's material, structural, physical and chemical properties.

Specific marks may be *qualitative* (attributive) and *quantitative*. The former are determined by qualitative characteristics, e.g. by a papillary whorl and/or break-in tool in rectangular form; and the latter by numerical values, e.g., number, width and angle of twist of the firearm bore rifles.

Depending on their origin, identification marks are divided into the *essential* and *accidental*. The former reveal the essence of a given object; without them it would not be what it actually is. This refers, for example, to marks characterising a pistol as a firearm. Accidental marks are those which do not touch the essence of the object in question and are characterised by chance distribution, even if they occurred under the effect of law-governed causes. This refers, for instance, to roughness in a pistol bore and the traces thus left on the bullet when the pistol is fired.

Direct comparison of identifying and identified objects is far

from always possible, since the trace could develop a transformed reflection of marks. For instance, traces on the bullet correspond to the projecting parts of the bore, and depressions in the footprint to the relief of the shoe sole. In such cases, identification requires samples for comparative study. Depending on the method used to obtain those samples, they are distinguished into *free* and *experimental* samples. Free samples are those not connected with a given crime, e.g., samples of human handwriting in private correspondence, business papers, etc. Experimental samples are obtained purposely in the course of investigation, e.g., a text dictated by the investigator to a suspect.

4. EXPERT IDENTIFICATION

Having collected the reflections of the object to be identified, i.e., its traces, trace copies, casts and photographic pictures, the samples needed for comparison and the materials relating to the fact to be established, the investigator sends all these to an expert for identification.

The general method of identification by experts involves: inspection of objects; individual investigation of objects; experiment; comparative study; assessment of marks and formulation of inferences.

During inspection, the expert studies all the objects and materials submitted to him. In this case, he would determine whether all the necessary objects had been forwarded to him, what they represent, whether they correspond to those listed in the statement prescribing expert examination, and whether they are suitable for identification.

In the individual investigation, the identified and identifying objects (including the comparative samples) are studied separately. The purpose here is to reveal as many marks as possible (common and specific) reflected in the traces and characterising the object to be identified.

The individual investigation may be accompanied by experiments for obtaining comparative samples, e.g., of bullets, cartridge cases or slash marks. Such experiments establish the stability and reproducibility of marks and also help to gain an understanding of the mechanism of trace formation.

An essential prerequisite for identifying an object is the com-

parative method. Comparison involves the simultaneous study of two or several investigation objects in order to establish their common and uncommon features.

In the comparative study of objects, the investigator compares the common and specific marks of the identified and identifying objects. This is, in effect, the most complex stage of investigation, for marks not only coincide but somewhat differ. The study of inevitable distinctions helps to better establish the identity and to determine the permissible level of distinction.

Distinctions may be caused by numerous factors, e.g., by the nature of the substance on which traces were left (drying of tree with slash marks); by the type of the surface on which the trace was left (a trace relief is indistinctly represented by rough outer surface of an object); and by use of object after it left its mark.

Natural distinctions are the result of processes that take place in living nature, in organic matter. Artificial distinctions occur when the object changes under some external effect. Age-related changes in the outward appearance of human beings would be considered natural distinctions, while plastic surgery causes an artificial distinction. These distinctions could be unavoidable (natural) and accidental; significant and insignificant. If the distinctions are significant, the inference would be that identity is absent. However, should a coincidence of marks be prevalent and the distinctions present insignificant, the inference would be that the object is identical. Thus, an expert's conclusions may be *affirmative* (in the presence of identity) and *negative* (in the absence of identity). With regard to form, conclusions or inferences may be *categorical* (say, the mark was left by an axe confiscated from M.) and *probable* (the mark may have been left by the given axe).

No matter what the expert decides, his findings must be outlined clearly so as not to allow for any ambiguous interpretation. The world-famous case of Nicola Sacco and Bartolomeo Vanzetti, two immigrant workers from Italy who were executed in the United States on August 23, 1927, clearly shows what vague expert findings can lead to.

On April 15, 1920, two men carrying the payroll money to the factory branch were assaulted in South Braintree, Massachusetts. Both were killed by handguns. One of the bullets extracted from the body of the guard Berardelli, the one that had mortally

wounded him, was marked with a Roman numeral III and was fired from a 32-calibre Colt automatic pistol, similar to the one taken from Nicola Sacco. A forensic ballistic examination was to play a decisive role in the case and the responsible official was Captain William Proctor, head of the Massachusetts State Police.

At the trial, Proctor declared that markings on the bullet Number III, i.e., on the one that killed Berardelli, corresponded to those on the test bullets fired from Sacco's pistol.

According to some sources, Harold P. Williams, prosecutor in the case then asked Proctor whether he was sure, and the latter replied that he was sure of that as of some other things.

Then Williams asked the decisive question.

"Have you an opinion as to whether bullet Number III was fired from the Colt automatic which is in evidence?"

And Proctor replied:

"I have."

"And what is your opinion?"

"My opinion is that it is consistent with being fired from that pistol."

After Sacco and Vanzetti were already convicted, Proctor admitted that he had merely stated that the appearance of the bullet was "consistent" with its passing through the bore of Sacco's pistol, and that if anyone in court had asked him more precisely whether he had found any evidence that the mortal bullet had passed through that particular Sacco's pistol, he would have answered without hesitation in the negative. However, the prosecution did not ask him about that, for they knew beforehand what the reply would have been. It was later revealed that Proctor had corroborated with the prosecutor concerning what the conclusion should be. The judge was also aware of this falsification, but silently approved the collusion. Hence, the conclusions of the defence experts were not taken into consideration, even though they were better grounded. As a result, innocent people were executed.

To make an expert's conclusions more impartial, and to convert the assessment of marks from qualitative to quantitative categories, methods of mathematical analysis are now being used more frequently. These improve the accuracy of comparison of objects. For example, instead of direct but approximated com-

parison of lines in traces investigators obtain profile outlines of traces to then calculate the results obtained and convert them into mathematical models. In this way, the comparison of models ensures greater accuracy and reliability of coincidence.

Mathematical methods make it possible to determine the measure of significance of marks and their totalities, assessing marks depending on their rate of occurrence (distribution). The use of mathematical methods enhances the authenticity of the expert's conclusion. In conducting specific types of examination, e.g., that of handwriting, portraits and motor vehicles, forensic experts use computers. The use of computers and mathematical methods speeds up identification and enhances the reliability of conclusions.

5. DIAGNOSTICS SERVES CRIMINALISTIC PURPOSES

Traces and other material objects (criminal tools, products of crime, etc.) contain much evidence that could be used not only to establish the identity of objects but to resolve other questions as well. For instance, footmarks not only help identify an individual but reveal the direction and relative speed of his movements and his physical condition. Marks left by a burglar reveal how he broke in, his habits and physical strength and, occasionally, the time of the crime. These and similar investigations are termed diagnostic.*

Diagnostic studies are conducted to determine the properties and state of the object in question, and to study the results of the effects and correlations of events (phenomena, facts).

In itself one of the methods used in the complex and diverse system of providing forensic evidence, criminalistic diagnosis is in complete agreement with the general principles of establishing the truth. If it were likened to a process of cognition, adducing forensic proof could be seen as mental reconstruction of a past event (crime) by its reflections in the environment. For instance, by studying an investigation procedure, one may judge why it was started; by studying some phenomenon, one may determine the essence of the event; and so on.

Diagnostic investigations help to determine the actual state of

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* *Diagnosis*<Gk *diágnōsis,* a distinguishing.

the object (whether the lock was in good order; whether a seal was replaced after the break-in; and so on) or reveal its initial state, e.g., restore the factory number originally punched on a car engine and then repunched by criminals who stole the vehicle.

Diagnostic studies are often combined with identification; however, they precede the latter. For instance, prior to identifying an object by its traces, the investigator determines their suitability for identification. In the course of such diagnosis, he establishes whether and to what extent the object's identifying marks were reflected in the traces; the actual state of the object at the moment when it left the marks (whether, say, the criminal's finger was spattered with blood or the car's right back wheel was poorly secured, and so on).

By diagnostic studies of traces left at the site of a crime, the investigator could solve a whole series of problems. He could recreate the manner in which the crime was committed and break it into individual stages. In investigating traffic accidents, for instance, diagnostic studies examine tracks to help determine the direction in which the vehicle was moving; establish the place of collision; specify the parts of the car that collided; learn whether the vehicles (or vehicle) had used their (its) brakes, skidded and/or overturned; determine why passengers were thrown out of a moving vehicle; and so on.

Diagnostic studies help to clarify the sequence of trace occurrence and, taking this into account, to determine the sequence in which the criminal acted. For example, based on the shape and size of bloodstains and amount of blood, a study of clues makes it possible to establish the exact spots initially injured in the victim; where and how the body was dragged; where and in what posture the body was located, whether that posture was changed; and so on.

Traces of a break-in show the investigator its direction (from outside or from inside), the criminal tools involved, whether the criminal was a professional, etc.

A man in charge of a storehouse at a Soviet car-repair factory reported to the militia that unknown persons had broken the lock and stolen some spare parts. When inspecting the site of the incident, investigators noted that the door and jamb had no outward signs of any break-in. The lock was shut and hanging on

the shackle of the open door, while the second shackle was in the lock ear, something that could not have happened without breaking open the door or the jamb with the lock shut. In continuing the inspection, they found marks of some solid object on the jamb where the bent shackle ends were previously located. And on the floor, under the jamb, lay splinters, the paint colour over which resembled that of the door and jamb. All this led to the assumption that the shackle ends were first bent back from inside and then the shackle jerked out from outside while opening the door.

Having studied the form and size of the traces on the jamb, the investigators began to look for the object with which the shackle ends were bent back. They noted a screwdriver lying on the desk of the storehouse manager, who claimed the tool belonged to him. A clue expert was asked whether the marks on the jamb where the shackle was secured had been left by the given screwdriver and whether the splinters were from the jamb. The expert replied to both questions affirmatively, and when his conclusion was presented to the storehouse manager, the latter admitted he had feigned the robbery by first bending back the shackle ends and then pulling the door to extract the shackle from the jamb.

Investigations involving an analysis of the correlation between facts and objects also belong to diagnostic studies. They disclose the presence of a causal relationship between a past action and its result, e.g., establish the fact of a malfunction of the firearm and a resultant shot occurring when the trigger was not pulled (when the firearm was dropped, shaken, etc.)

A type of causal relationship analysis is the establishment of whether specific actions may have been perpetrated under specific conditions. Not infrequently, this is done to check whether the testimony of a person is really correct or to make sure that compromising tracks appeared in conditions irrelevant to the crime in question. For example, driver B., accused of a hit and run, testified that the damage on his car had occurred when he had hit the door of the garage upon leaving, not because he had knocked down somebody. A diagnostic study of the marks allowed the expert to establish that their form, size and location on the car excluded the likelihood that they had appeared because the vehicle had hit the garage door. At the same time, given the

injuries on the body of the victim, the marks could have been made in knocking down a man.

In cases when diagnostic studies are conducted in relation to objects and their reflections, the investigator pays special attention to the informative aspect of the marks. However, the study of these marks (common, individual, quantitative, qualitative, essential, and/or accidental) is conducted to establish the mechanism, causes and conditions of trace formation, not to identify a given object.

In a diagnostic study of the correlation of events, the investigator studies the mechanism that might be revealed and understood by examining the various reflections of a given event. One of the manifestations of the regularities of a given material process is its recurrence. Criminalistics has accumulated no small experience in analysing typical situations occurring in analogous crimes (analogous actions) that cause definite similar changes in the environment. Information concerning typical situations is used to solve diagnostic problems in every concrete case. For example, an analysis of investigatory and expert examination practices makes it possible to accumulate material on the varieties of ways used in breaking obstacles, locks, seals and so on.

Having analysed the respective outward marks and making deductions based thereupon regarding the characteristics (properties) of a given object or concerning the conditions of a given event (action), the expert compares those conclusions with typical situations (typical models) of similar events. As a result, he formulates a conclusion on the causes of the event; the likelihood of it being committed in specific conditions; and so on.

For instance, an examination of tracks at the site where two cars collided reveals which of the tracks appeared from turning wheels, which resulted from skidding, which resulted when some car parts fell off in the collision, and so on. An analysis of the tracks and substances that peeled off in the collision (paint, dirt, etc.) could help establish the exact site of the accident. Based on an integral analysis of all the tracks, the diagnostic method would reveal the whole dynamics of the traffic accident, i.e., the direction and mode in which the cars were moving prior to colliding; the site, line and angle of the collision; the dynamics of the impact of the two vehicles; and their direction of travel following the collision.

Conclusions based on the results of diagnostic studies are formulated depending on the purpose of the investigation. They may show that the event could have taken place in given conditions; explain the occurrence of traces under definite circumstances; and reflect the real existence of a given fact or establish the causal relationship between facts.

6. CRIMINALISTIC EXAMINATION AND ADVANCES IN SCIENCE AND TECHNOLOGY

Examination is conducted in some definite, regulated, procedural form. The course and results of an examination by experts is formalised by a special procedural document, namely by an expert's resolution, which is essentially one of the independent forms of forensic evidence stipulated by law.

Today, there are many forms of forensic examination, which are classified depending on the object and method of investigation. They include criminalistic, forensic medical, psychiatric, engineering-and-technical, biological, financial-and-economic, and other forms of examination.

The following traditional criminalistic examinations involve: (1) study of materials, substances and products therefrom; (2) forensic study of portraits; (3) forensic examination of handwriting; (4) technical-criminalistic study of documents, including photographic techniques; (5) study of clues; (6) forensic ballistics; and (7) phonoscopic studies.

The following are distinguished among forensic examinations of materials, substances and products therefrom: (a) soil studies; (b) study of paint-and-varnish materials; (c) study of fibres and fibrous materials; (d) examination of metals; (e) study of glassware, china-ware, and earthenware; (f) study of fuels and lubricants; (g) study of plastics and polymers; and (h) study of narcotic substances.

Today, expert examinations involve extensive use of physicochemical methods adapted to examine specific objects of forensic science. In criminalistics, such methods are called instrumental and are classified depending on the properties studied:

I—methods for examining morphological signs of objects; these include microscopic (optical) procedures, special photo-

graphic techniques (photography in invisible spectrum, contrast intensification), photomicrography, and X-ray radiography;

II—methods for examining significant individual physical and chemical properties (hardness, electric conductivity, heat conductivity, reflectance, etc.).

III—methods for examining internal structures (ultra-microstructures), i.e., X-ray diffraction, electron-microscopic, and other methods;

IV—methods for examining atomic and molecular compositions (atom absorption analysis, neutron activation analysis, emission spectrography, chromatographic analysis (gas chromatography, gas and liquid chromatography); infrared spectroscopy, etc.

The few methods listed above show the increased possibilities of forensic examinations, including those by experts in criminalistics. At present, the most typical technique involves a combination of methods for studying morphological signs with physicochemical procedures.

In addition, laser microspectral analysis, infrared spectrometry, polarographic analysis, and other methods are also successfully applied in investigating crimes.

Once, the flat of a resident of a small Soviet town was burgled. The padlock on the door was broken and the case and ear, painted with green and red paint, respectively, had indentations from the break-in tool.

In the course of the investigation, the police came to suspect a man called Ivanchenkov because a search of his flat revealed the stolen articles and combination pliers, whose working surface showed a barely visible red mark. A combined commission of experts in the study of clues and in forensic chemistry was appointed to investigate the case and establish whether the padlock on the door of the burgled flat was broken by the pliers taken from Ivanchenkov.

The expert in the study of clues began to examine the marks on the broken padlock and established that the burglar had torn out the ear from the case and had bent it. Numerous marks of pressure and sliding, mostly linear in form, were left on the interior and exterior sides of the ear. There was also a dent on the lock body, and some of the lines were parallel.

In examining the lines under a comparison microscope, sliding

marks were found to have had lines in the form of grooves and ridges, while the pressure traces had the same grooves and ridges, but transversal, not longitudinal. The expert also discovered grooves and ridges on the working surface of the pliers, which he used to experimentally reproduce pressure traces on a round lead rod of the same diameter as that of the lock ear. Then these traces were compared under a microscope and were found to match in form, size and location of the grooves and ridges. This matching was also confirmed on contacting the working surface of the pliers with the marks on the ear. The expert in the study of clues concluded that the lock was broken with these very pliers. Afterwards, chemical particles of the criminal tool were subjected to forensic chemical examination.

At fifty-six-fold magnification, two flat red particles, size 70x50 and 10x30 microns, were visible on the combination pliers. The investigator took particles of the red paint from the lock for comparison with these from the pliers and subsequent laser microspectral analysis of both.

Spectral analysis is a method for determining the chemical composition of substances by means of the spectra they produce. To perform spectral analysis, the substance is converted to a gaseous state. To do this, it must be introduced into the flame of an oxyacetylene or other torch, into the arc or spark discharge. In our example, the expert used a laser installation for that purpose.

Under high temperatures, the substance evaporates and the obtained individual atoms are excited to emit light. The resultant spectrum is recorded by a spectrograph and then interpreted using special tables; in other words, the investigator determines what elements are present and in what quantity.

In the case described above, the expert made the following conclusion: "An analysis of the resultant spectrograms showed: (1) zinc, calcium, copper and iron to be contained in the red particles revealed on the working surface of the combination pliers; (2) zinc, calcium, copper and iron to be also contained in the red paint taken from the lock. The obtained results offered grounds for inferring that the paint particles on the pliers were identical in colour and chemical composition with the red paint with which the lock was coated." Thus, a chemist's conclusion confirmed that of the expert in the study of clues.

Recently, lasers have come to be used to reveal fingerprints. Canadian criminalists discovered that fingerprints luminesce when illuminated with a specific laser wave length. The new technique reveals handmarks over fabrics, rubber, plaster and other surfaces where they are usually hard to see; moreover, they remain up to ten years, with even the pores in the finger skin distinctly visible.

In addition to laser spectral analysis, investigators also use infrared spectroscopy, an art based on the same principles as spectral analysis. Infrared rays excite the molecule spectra of the substance examined to cause selective absorption of the light emitted by the source; as a result, in observing the spectrum of a source whose light had passed through the substance analysed, darkenings are noted in that spectrum. In infrared rays, they appear in the form of bands with clearly pronounced absorption peaks, and it is by these bands that the investigator assesses the qualitative and quantitative composition of the substance in question.

The Soviet criminalist A. V. Kizner was one of the first to have applied X-ray diffraction method in conducting expert examinations. The method is based on the property of X-rays to be scattered by substances with crystalline structure, and the nature of this scattering depends on the crystal forms.

If one were to direct an X-ray beam at a crystalline substance and place a photographic film behind the latter, the film would show concentric rings, whose number, density and cluster spacing would give an idea of the crystalline structure of the substance examined. For instance, one could distinguish two pieces of metal of the same chemical composition when one of them was subjected to heat treatment and the other to mechanical treatment. Their crystalline structure, determined not only by chemical composition but physical effects as well would differ.

Experts in the study of clues have also come to use dendrochronology, which can help establish whether the wooden parts of objects once constituted a whole even in cases where there are no common separation lines (cuts, slashes and/or fractures) and determine the tree species from saw-dust, the age of the tree, its place of growth and the date of felling. By measuring the width of the annular rings, the investigator uses four radii to draw up a dendroscale, strictly individual for each trunk and

branch, and consequently for their parts. To establish the tree species, small timber particles are boiled in strong sulphuric acid till they separate into fibres. The fibres are then dyed and studied under a microscope to specify pores, hollow swellings and other signs characteristic of a given tree species.

For instance, in inspecting the site of a murder, the investigators discovered that the dead body was lying on a pile of saw-dust. One of the suspects was also found to have saw-dust on his shoes. When this was compared with the saw-dust from the site of the crime, it turned out that both samples had come from sawing the same tree species: the pine, spruce, asp and birch. Thus, an expert's conclusion helped to expose the criminal.

What is commonly termed "dust" represents microparticles of various substances, such as wood, dyes, soil, rust, ash and so on. In fact, "dust" has for some time attracted the attention of criminalists. Taking into account the important criminalistic significance of various types of dust, Soviet criminalists have developed devices for removing it from small items such as keys, coins, etc., and also from clothes. The visual method of investigation was superseded by the more accurate and effective mineralogical, spore and pollen, organoelemental and other techniques.

It is common knowledge that the soil whose dust particles are submitted for expert examination has a complex structure, different mineralogical composition, and a diversified set of spore and pollen grains. Such soil may be examined for any of these elements. For instance, every vegetation zone has characteristic spore and pollen spectra, whose stability, as soil scientists' experiments have indicated, is expressed in that the spore and pollen complex forms over many years to reflect the composition of the flora of a given locality. For instance, during one examination, pedologists compared soil samples taken from the site of a crime with those taken from the clothes of the suspect. Under a microscope, both samples were found to contain particles of a rare plant. Moreover, the compared samples were noted to contain the same percentage of carbon, hydrogen, and nitrogen, and also to react in the same way to sulphur. All this showed that the soil particles on the suspect's clothes had come from a specific locality.

The Yugoslav criminalist Vlado Vidic cites an interesting example of how a crime was solved by examining dust samples.

In Tivoli Park, Ljubljana, 19-year-old Nadia A., a student from the Institute of Economics, Radovljica, was found dead. Judging by the circumstances of the case, she had most probably been raped and strangled. It was discovered that the criminal had stolen the girl's ring with an embedded gold coin depicting former US President John F. Kennedy.

Several months later, a certain Yuri K. was arrested for burglary in the vicinity of Ljubljana. Among the other items found during a search of his flat, the police discovered a similar gold ring. Inspection of the ring revealed a slight amount of soil, and the subsequent spectroscopic analysis showed its composition to be homogeneous with that of the soil from the site where A.'s body was discovered. An infrared spectral analysis of the dust from the gold coin established that its chemical composition was that of the dust samples taken from the window of the room in Radovljica where the victim used to live. A well-known mineralogist also took part in the investigation, and he concluded that the soil particles on the ring had the same composition that could, in the Ljubljana area, be found only near the site of the crime. Pressured by these clues, the criminal admitted he was the murderer.

In studying microobjects neutron activation analysis is of major significance. Neutron activation analysis is based on the study of induced radioactivity occurring in the examined object when bombarding it with neutrons.

Let us suppose there is ground to assume that the clothes of a murder victim may have particles of the fabric from the criminal's clothes; a car—flakes of paint from another car; and a broken door—remnants of metal from the burglar's tool. In these cases, the investigator would take a small sample (of the paint, metal, etc.) and bombard it with neutrons in a nuclear reactor. Under the effect of radiation, the sample would become radioactive, i.e., the chemical elements contained therein would turn into ray-emitting isotopes. Different isotopes show on the indicator screen separately from one another; so, within a short period of time, one may obtain an accurate picture of all the elements contained in the given sample by their look and mass.

Suppose the expert would then examine the clothes of the man suspected of the murder and reveal the same chemical "signs" as in the sample from the site of the crime, that would

be important evidence showing that the suspect was there. The advantage of this method is that it may be used even when no visible traces of the criminal's clothes remained on the victim. Besides, to find the culprit, one may also use the remains of paint, rubber, leather, lacquer and/or medicine on his clothes. Even dust in the footwear seams can be compared with the dust taken from the site of the crime.

The reliability of activation analysis has also been confirmed in exposing criminals who used firearms. After firing a pistol shot, the back side of the palm holding the weapon still has microscopic barium particles, and after firing a rifle, barium traces also remain on the shooter's face. G. Goldhaar, a Romanian criminalist, used activation analysis to reveal the traces of a close-range shot and to determine the distance it was fired from.

Activation analysis has proven effective in revealing poisons in biological tissues. Experiments have shown that arsenic, mercury, antimony, thallium and some other poisons may be revealed even when their amounts do not exceed 10^{-7}-10^{-11} gr. Incidentally, activation analysis was used to verify that Sweden's King Eric XIV was poisoned in 1577 with a mercuric chloride put in his soup. The mercury traces found in his remains are conclusive.

In cases of arsenic poisoning, there is evidence that activation analysis can determine not only the amount of the substance in the hair but, taking into consideration hair growth, is able to establish when and in what doses the poison was administered.

British scientists A. Perkons and R. Jervis suggested that activation analysis be used to establish to whom hair belonged. Because some types of hair are very similar in outward appearance, even under a microscope, it was often quite difficult, and even altogether impossible, to determine from whom the hair came if, for instance, a lock of it was found clenched in the victim's hand. Perkons and Jervis concluded that the relative amount of various microelements revealed in activation analysis was the same for the hair of the same individual and, at the same time, different for the hair of different people.

Finally, according to some scientists, activation analysis proved to be a good method for examining ancient coins and paintings. It made it possible to distinguish gold- and silver-plated articles from gold and silver articles without damaging them,

and to reveal fake "masterpieces" which were once the pride of public and private collections.

In recent decades, the demand for paintings by old masters and for various antiques has grown remarkably, and this has given rise to a special type of crime. The market is flooded with fake paintings, sculptures and earthenware. In fact, they are often so skilfully made that even highly qualified specialists are often deceived. According to one American art critic, of the one thousand registered paintings by Rembrandt scarcely forty could be genuine.

Former methods of revealing fakes were not always sufficiently effective, so here, too, neutron activation analysis has proved useful. It turned out, for instance, that the white lead used by artists in the past contained relatively large amounts of mercury, copper, and silver, ostensibly because purification methods were imperfect. In the white lead used today, these substances are virtually absent.

The use of new investigation methods widens the scope of objects which the investigator could use as material evidence. The list of means with which one can identify the criminal is growing, and recently has come to include "voice prints" in the form of various phonographic recordings. The identification of a person by his or her voice is termed *vocalographic* or *phonoscopic* examination.

Every human voice is strictly individual, and so is the pronunciation of various sounds. If sound oscillations are converted into electromagnetic waves and then represented graphically, one obtains a peculiar sound "drawing" called a vocalogram. The vocalograms of one person differ from those of another person. At the same time, experiments have shown that vocalograms do not alter with time, provided the speech organs are not changed physically, e.g., by removal of teeth, adenoids, etc.

Theoretically, the possibilities of criminalistic examination in identification and differentiation are boundless and depend only on the extent to which the investigator is willing to learn more and more relevant marks.

Criminalists increasingly co-operate with representatives of other sciences in trying to solve cases. In Canada, for instance, investigation agencies frequently seek the assistance of meteorologists. In Toronto, meteorologists helped to identify a murderer

when the police found a wet plastic mantle in the victim's handbag. Meteoradar readings showed that on that day it had rained in only two areas of Toronto. By questioning the policemen who were on duty in those areas, the investigators made an arrest in just a few hours.

Physics, chemistry, biology and medicine all contribute to combatting crime by co-operating with criminalistics, as do the fields of electronics, cybernetics and many other sciences.

To ensure that this wealth of expertise is used to the full and that the scientific foundations and practices of expert examination continue to improve, the USSR has created a ramified system of forensic institutions.

Chapter 3

THE STUDY OF CLUES

1. PATHFINDERS AND THE STUDY OF CLUES

The study of clues is the branch of criminalistic technology that works out methods, techniques and scientific and technological means for revealing, establishing, taking and examining traces to clarify circumstances that may help investigate, reveal and prevent crimes.

The art of "reading" traces dates back to ancient hunters, and is still practised today in the Indian tribes of Khoya and Puggy (Kapurthala Province). There are records of a case when a Khoya tracked a murderer by his footprints for 300 kilometres from the site of the crime. He finally caught up with him and handed him over to the authorities. Today, Australian aborigines still possess this skill.

Every crime causes definite changes in the environment. Depending on their nature, traces are classified into three major categories: (a) trace-reflections; (b) trace-objects; and (c) trace-substances.

The study of clues chiefly examines trace-reflections, which are understood to be traces that reflect the marks of the object which left them and/or their forming mechanism. A reflection could be a handmark; a break-in mark left by some object; a tyre mark; etc. These and similar traces could represent the outward signs of the object which left them. Blood stains*, knots, hand seams, etc., may be regarded as traces reflecting their forming mechanism (but not object).

Trace-objects also carry marks of the object that helped form them or change their state. These include locks, seals with signs of destruction, and fragments of objects. The study of such

* This implies the criminalistic study of the shape of bloodstains, not biological properties of blood.

objects is achieved by methods used in the study of clues. As for trace-substances (particles of car paint coating, fuels and lubricants, ets.), they play an auxiliary role in the study of clues and are examined as a part of the study of materials, e.g., to establish the nature, classification, etc., of a given substance.

Depending on the objects that leave trace-reflections, we distinguish:

(a) human traces (anthroposcopy);

(b) traces of tools, implements, and mechanisms (mechanoscopy); and

(c) traces of vehicles (study of transport clues).

The significance of the criminalistic study of traces lies in that it makes it possible to establish the various circumstances of the event in question. Here, like in other criminalistic investigations, the investigator solves identification and diagnostic problems. The former include identification of objects by their traces. This implies both individual identification and establishment of the group to which a given object belongs.

In solving diagnostic problems, the investigator determines the mechanism of trace formation, the state of a given object and its correspondence with prescribed characteristics and the causal relationship between a given event and its result.

The study of clues helps to search for wanted persons, objects and/or vehicles; to obtain evidence on the subject of a given crime (his or her physical features, clothes, etc.), on the method used in perpetrating that crime and on the object of the criminal attempt; it also helps reveal the presence of a relationship between the detected traces and the criminal actions of a specific individual.

2. TRACE FORMATION AND CLASSIFICATION

The basic underlying principles of the criminalistic theory of traces are as follows:

(a) All objects of the material world, specifically their outer structures, are individual. The outer structure of homogeneous objects may coincide in common marks (form, size, etc.), but inevitably differ in specific marks. Specific marks in the study of clues include microstructural details (particulars). The totality of these details forms what is termed as surface microscopic

relief (microrelief). Microrelief details in a slash mark might be the grooves and ridges (lines) left by unevennesses in the axe edge; a fingerprint reflects details of the papillary pattern; and a tyre impression—the specific marks of some wheel defect (chunk-out of tread, cracks, etc.).

In keeping with the theory of criminalistic identification, the investigator in each case reveals the totality of specific marks capable of individualising the object to be identified. To find and distinguish this totality and also to assess it as sufficient for identification purposes, one must know the processes that govern the forming of the object's outer structure. These include the conditions of material processing and manufacture of specific objects, and the conditions in which objects are used, stored, and so on. Taking this into account, every type of object subjected to the study of clues has sets of common and specific marks used in solving identification problems.

(b) An object's outer structure, including its specific marks (details) can, under certain conditions, be reflected quite accurately in other objects in the form of trace-reflections. The completeness and accuracy of the reflection of specific marks depends on the conditions of trace formation. The principal ones are the physical properties of the materials making up the objects (forming and receiving layers), and also the object's interaction mechanism. The more pliable the trace-receiving object and the finer its structure, the more distinct and pronounced the trace's ability to reproduce details.

(c) The reflection of the object's outer structure in the trace is invariably transformed, i.e., it is inverse (negative) or looking-glass reflection. For example, a convex object (shoe sole) leaves a concave mark in soft material (sand, for instance). Depending on the conditions of the trace formation, one can observe other changes as well, e.g., uneven relief leaves traces in the form of scratches.

The study of clues examines the traces of mechanical effects that occur when two objects meet. The object on which the trace remains is termed *trace-receiving*, and that which has left the mark *trace-forming*. The surface parts with which they made contact at trace formation are called *contact surfaces*.

The process of trace formation during mechanical interaction is determined by such factors as the physical properties and in-

teraction intensity of objects. The forming of every trace is accompanied by the action of forces with different magnitude and direction. To begin with, it is the external force that induces the motion and contact of objects which take part in trace formation. Secondly, these are elastic (inner) energies of deformation, frictional and other forces.

Depending on how they were formed, traces are classified into the following groups: static (point) and dynamic (linear) and volumetric and surface.

Static (point) traces are those when every point in the trace-forming object leaves an adequate reflection in the receiving object. The trace forms when the object, which was before that travelling along the normal (i.e., perpendicular to the receiving surface) without shifting sidewards, stops moving. Thus, when traces occur, objects are in a state of relative quiescence (statics). An example of a static (point) trace is the reflection of a shoe sole when a man is standing; the reflection of a crowbar when a door is being forced open; and a fingerprint showing the papillary pattern.

Dynamic (linear) traces occur at displacement of points of the trace-forming surface along the receiving surface. In this case, each point in the trace-forming surface leaves a mark in the form of a line. The salient parts of the microrelief are reflected in the form of indentations (grooves), and the concave parts—in the form of protrusions (ridges). Traces of cuts, slashes, friction, etc., are regarded as dynamic. They occur under the effect of tools and implements, at sliding contact of vehicles in collision, and in other similar cases.

Static and dynamic traces may be both volumetric and surface.

Volumetric traces are concave and occur when the trace-forming object is pressed into a softer trace-receiving surface, which, in this case, acts to deform. In such traces, the object is reflected in all three dimensions. Traces of treads on wet sand and a pressed-in trace in a wooden door from a blow by a metal object are examples of volumetric traces.

*Surface** traces occur when both objects (the one that forms and the one that received the trace) are approximately equal in

* Surface trace is a conventional notion, since they also have a third dimension. Yet, their depth (height) is so slight that it is disregarded.

hardness, or when the hardness of the receiving objects is greater. This results in flat, not volumetric, traces. For example, a sole mark on a wooden floor, a fingerprint on glass and a tread trace in asphalt would all be surface traces.

Surface traces may be the result of either deposition or separation. The former occurs when particles that separated from the trace-forming object are deposited, and the latter—when some substance that covered the receiving surface, e.g., dust, paint, blood, etc., is removed by the trace-forming object.

Traces are divided into *visible, slightly visible* (poorly discernible) and *invisible* or latent. Visible traces are revealed without any special techniques, since one can see them well with the naked eye. Slightly visible or latent traces may be due to the absence of colour (unpainted or colourless traces), masking (unfavourable) colour of the receiving surface, and very small dimensions (micro-traces, microparticles).

Slightly visible and invisible traces can be revealed only by applying special illumination techniques, or by mechanical or chemical tests on the surface where the trace is assumed to be present.

3. HUMAN TRACES

The following human traces are distinguished with regard to the study of clues: hand (glove) marks; foot (footwear) marks; tooth, nail, lip, nose, and other body marks; imprints of clothes; and blood stains.

As compared with other traces, *handmarks* are used most frequently and successfully in investigating and uncovering crimes. The palm of the hand (and the sole of the foot) is covered with papillary lines (linear ridges of insignificant height and width separated by little troughs), which make up different types of patterns.

In addition to papillary lines, traces also reflect other marks of the palm skin relief. These include flexor (bending) lines, wrinkle folds and pores, and also artificial marks, e.g., scars, acid burns, etc.

In criminalistics, the greatest significance is attached to the

patterns created by papillary lines, particularly to those on the surfaces of the fingertips (dactyloscopy).*

Dactyloscopy is very popular. It had hardly made its debut in criminalistics when it began to be written about in fiction. In fact, the great American writer Mark Twain was one of the first to shed light on the possibilities of dactyloscopy in tracking and exposing criminals. In his stories *Life on the Mississippi* and *Pudd'n'head Wilson,* the use of dactyloscopy plays an important role in the plots. Mark Twain was undoubtedly the first writer who appreciated the merits and possibilities of this then quite novel scientific method of identifying people.

The criminalistic significance of papillary patterns is determined by their very important properties, namely individuality, relative stability and reproducibility.** All these are determined by the skin's anatomic structure. Papillary lines are formed in the foetus and remain relatively unchanged throughout one's lifetime. The only thing that changes is their size, but not the relative position and the shape of the pattern details. This stability is an important property in the study of clues.

The papillary pattern can regenerate its former form following injury of the epidermis, or outer skin. If the true skin (derma) itself is damaged, the pattern is not restored in the affected site. However, the artificial marks (scars and/or cicatrices) that appear in such cases would turn into distinctive pattern features themselves. American gangsters were the first to have resorted to acids, other caustic substances and even surgery in order to change their papillary line patterns. The first who tried this was the celebrated John Dillinger. He subjected his finger bulbs to the action of a caustic substance, but the scars that subsequently formed served to identify him as well.

The individuality of the papillary pattern lies in the unique totality of its characteristic marks, which are classified into common and specific (details). Specific marks are most abundant

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* Dactyloscopy (Gk. *dáktylos*—finger, toe, and *skopia*—watching). The study of palm surface is termed ***palmoscopy,*** and the study of pores ***poroscopy.***

** The fourth quite important property is convenience of classification; in this chapter it is not discussed because it is outlined in the chapter on criminal registration.

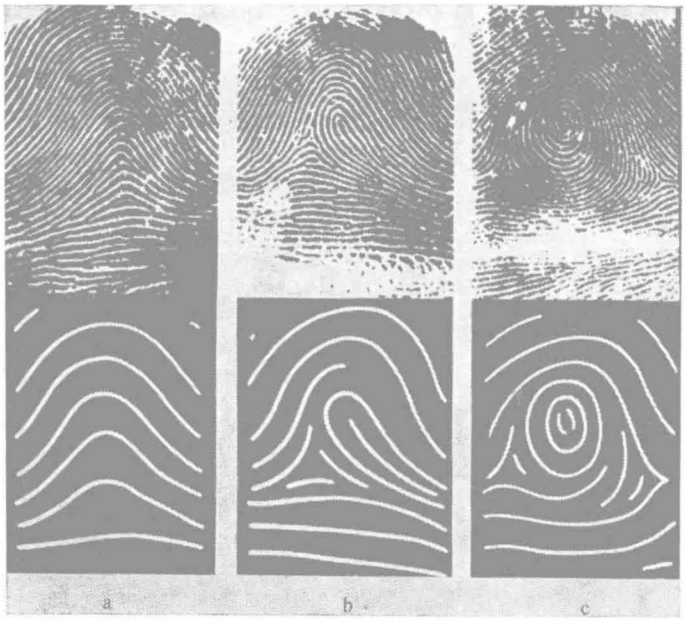

Fig. 2. Types of papillary patterns: a) arches; b) loops; c) whorls (*above:* pattern; *below:* its scheme).

in the patterns on the fingertips. Common marks are used to classify these patterns into arches, loops and whorls (see Fig. 2).

To determine the type of pattern, the investigator studies its central part (core). In the arched pattern, the lines forming the picture extend from one edge of the finger tip to the other. This type of pattern is simplest in structure and relatively seldom observed (in about 5 per cent of all cases). Arches may be simple and complex. In complex arched patterns, the papillary lines in the centre may be either curved or have the form of an incipient, undeveloped inner pattern.

In the *looped* pattern, the lines forming its core extend from one side of the finger to the centre and then turn back to the same side. The ends of the lines turned toward the finger side are called loop branches, and the rounded part—the loop head. Diverging lines bending around the loop from top and bottom are situated at the head of the loop. The site where the lines diverge is called the *delta*. The loops may have both relatively

simple and more complex structures depending on the inner part of the pattern. Halved, closed, curving, parallel and counter loops are assigned to complex structures.

In addition, all looped patterns are classified as *ulnar* or *radial* ones. The former include those whose open section is turned toward the little finger, and the latter—those whose open section is turned toward the thumb. This classification is significant for deducing dactyloscopic formulae and for determining the hand and finger which left the marks. Loops are the most widespread patterns, constituting about 65 per cent of the total.

The third type of patterns are whorls. They have two deltas (rarely three and even four deltas) to the left and right of the pattern core. Between the deltas, there is a pattern in the form of concentric circles, ellipses, spirals and twinned loops. Again, whorls are subdivided into simple and complex ones.

The above-mentioned three principal types of patterns and their varieties make it possible to initially distinguish fingerprints by their common marks.

When experts identify a person by papillary patterns, they take into consideration coincidence both by common (type of pattern, direction of line flows) and specific marks (details) of the pattern. These are the beginnings and endings of lines; their convergence and bifurcations; line fragments; hooks, bridges, islands, dots, curvatures, discontinued lines and fine lines (see Fig. 3). It has been established that the presence of 12-17 coincidences of details in a fingerprint allows identification. In practice, identification may be achieved with fewer coinciding details (7-8-9), provided they are rare and, hence, more significant (see Fig. 4).

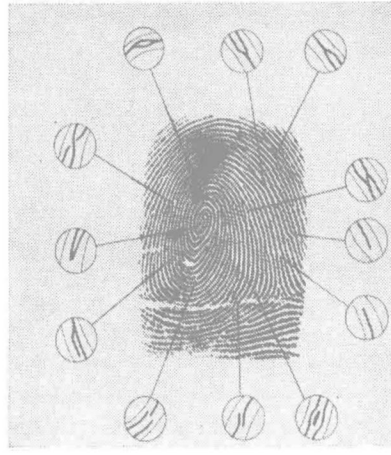

Fig. 3. Details (specific marks) of a papillary pattern.

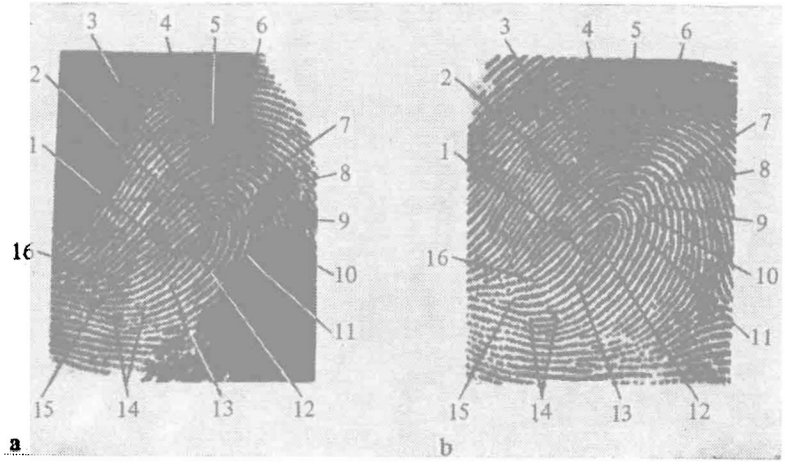

Fig. 4. Expert examination of a papillary pattern trace: a) trace discovered at the scene of a crime; b) fingerprint of a person to be identified.

In addition to examining marks from the papillary patterns of fingertips, the investigator also studies marks from other parts of the palm (palmoscopy). When the details reflected in the trace are insufficient, he uses additional marks (micromarks), which include pores (poroscopy) and the finest particulars of papillary lines, e.g., the form of the line edge and the form of the line beginning or ending. Such marks are termed *edgescopic*.

The expert resorts to the study of edgescopic marks, poroscopic ones inclusive, in cases when the trace reflects few individual macromarks (details). In accordance with expert examination practice in the USSR, if specific marks number less than twelve (for rarely occurring marks, the number is reduced to eight), this is regarded as insufficient for identification. However, having established the coincidence of 6-7 macromarks (structural details) and added to them the coincidence of the same or greater number of micromarks, the expert would have grounds for making an identification.

Handmarks are also used to solve diagnostic problems, for example to establish which hand and fingers left the marks, the mechanism of trace formation (by clenching or touching the object); the approximate age of the suspect; his professional characteristic, anatomic peculiarities and so on.

Aware of the great significance of handmarks as evidence, criminals often wear gloves. If the criminal used leather or cloth gloves, the resultant marks could also be used for identification. The marks are left due to dirt on the gloves, or if they are permeated by fatty excretions.

Leather glove marks reflect the pattern of the leather, and the wrinkles, folds, and defects that occurred in wearing them. Cloth glove marks reflect such features as thread width, type of interlacing, fabric defects and selfmade seams. The seam area is particularly valuable for identification, since it forms a unique convergence of threads from two pieces.

4. FOOTPRINTS

The inspection and expert examination of footprints helps determine a number of important factors that could be used in tracking down a criminal. Footprints allow the investigator to determine the person's height and individual gait, his type of shoe and his direction and speed of motion. In fact, they could be used to identify the person in question or his footwear.

Prints left by bare feet, shoes and sock- (stocking)-covered feet are to be distinguished. Bare footprints reflect the size of the foot (its overall length and width of the metatarsus, heel and bridge section); length and width of each finger (see Fig. 5); the general shape of the foot (the shape of a footprint depends on the instep of the foot which could be high, medium or flat); the general structure of papillary patterns: and presence of flexor (bending) folds.

Specific marks of bare footprints include: the comparison of toe dimensions; the toe shapes; the toe location in relation to the anterior metatarsus margin; bending upwards of individual toes; presence, form and sites of various injuries and deformations (scars, corns); and specific marks of papillary patterns.

Criminalists have long ago established that the papillary pattern on the sole of the foot, like that on the palm surface is constant and strictly individual. This is why some maternity homes take the footprints of newborns: to prevent any mix-ups and to facilitate, if need be, identification. The fingers of newborns are

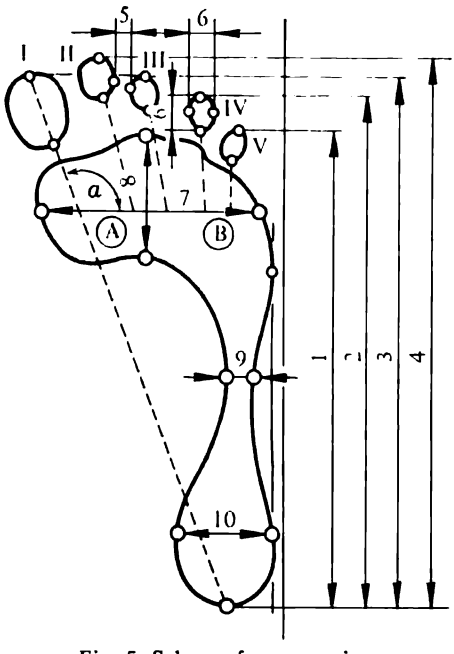

Fig. 5. Scheme for measuring a bare footprint.

so small that they could not be used for dactyloscopy. In fact, we know of a case when a recently confined woman fell ill and the doctors instantly took the newborn away from her. One and a half years later, she saw her child again, but began to doubt whether it was hers. In fact, she was convinced it was really hers only after she was shown the footprints taken immediately after birth and at the age of eighteen months. The coincidence of the patterns was so obvious that no other proof was needed.

If the investigator uncovers a print of a sock-(stocking)-covered foot the common marks to look for in such a trace, in addition to the footmarks reflected, would be the type and design of thread interlacing, and the manufacturing seams in the area of the heel and toe.

The following are used as specific marks in identifying a person by a print of a sock- (stocking)- covered foot: presence and site of manufacturing defects (uneven threads and/or knots in threads); particulars of thread convergence and thread convergence angle in seams: presence, shape, size and sites of damages, patches, darns and self-made seams; number and location of stitches in darms, self-made seams; and so on.

If the entire sole is not reflected in the footprint, this should not prevent the investigator from fixating and taking the trace. In fact, there are formulae with which one can calculate the length of the entire sole by the size of the metatarsus or heel.

In practice, the investigator has to deal more often with shoe

prints. The common sole marks of the shoe are (see Fig. 6): sole structure; size of entire sole and its parts; sole shape; surface relief; method used in securing the sole and its parts; and presence of cleats, calks, trademarks and other designations.

Specific marks for identifying shoe soles occur both when they are manufactured and worn. Those arising during the manufacture of the product could involve cluster of nails (pins) in individual sites; uneven stitches; and presence, form and size of flaws (air holes) and cuts in rubber soles. The following marks occur when wearing and repairing footwear: traces of wear (contour, size and location); and holes, cracks and patches (their shape, size and location).

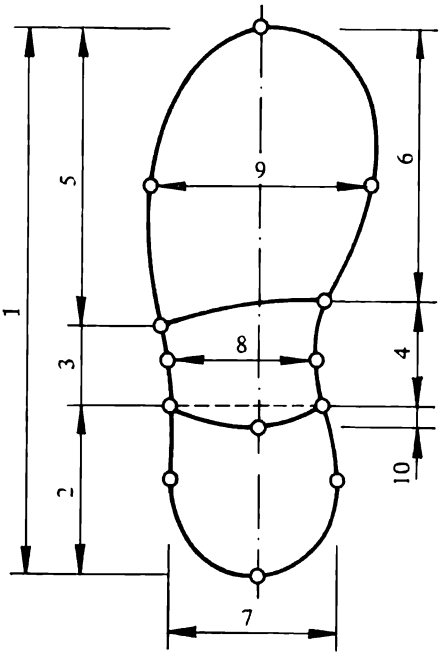

Fig. 6. Scheme for measuring a footwear sole mark.

It is sometimes held in criminalistic literature that shoe sole identification is possible only by a volumetric trace. However, it actually depends on the conditions in which the traces are formed and the clarity with which the marks are reflected. To cite an example, while stealing valuables and money from a safe in a Moscow savings bank, a burglar was working in the dark and did not notice that he dropped some typing and carbon paper onto the floor from a desk close by. In falling, the right side of the sheet of carbon covered a sheet of typing paper. Moving around the room, the criminal stepped on the "sandwich" and left a distinct heelmark, which was discovered in the morning. The investigators surmised that it undoubtedly belonged to the

thief since it was unlikely that the women who worked in the bank would have allowed paper to lie about the floor. Subsequently, the trace was used to identify the footwear.

In addition to identifying the subject by an individual foot (footwear) print, one can also resolve other diagnostic questions. By the shape of the footprint, and by the depth of depression of the heel, toe and intermediate sections of the shoe, one can establish whether the subject was standing or moving, and, if moving, at what relative speed, i.e., whether he was walking slowly or quickly, or running.

A man's footprint can be used to establish his height and shoe size. Soviet anthropometric studies have established that the size of the human foot is equal to 15.8 and 15.5 per cent of the male and female height, respectively. Hence, if a bare footprint has been discovered at the site of a crime, one need only multiply its length by 100 and divide it by 15.8 or 15.5 to learn the suspect's height. If the trace is made by shoe, one should first subtract from the length 1-1.5 cm, i.e., the number of centimetres by which the shoe sole exceeds the insole length equal to the foot length.

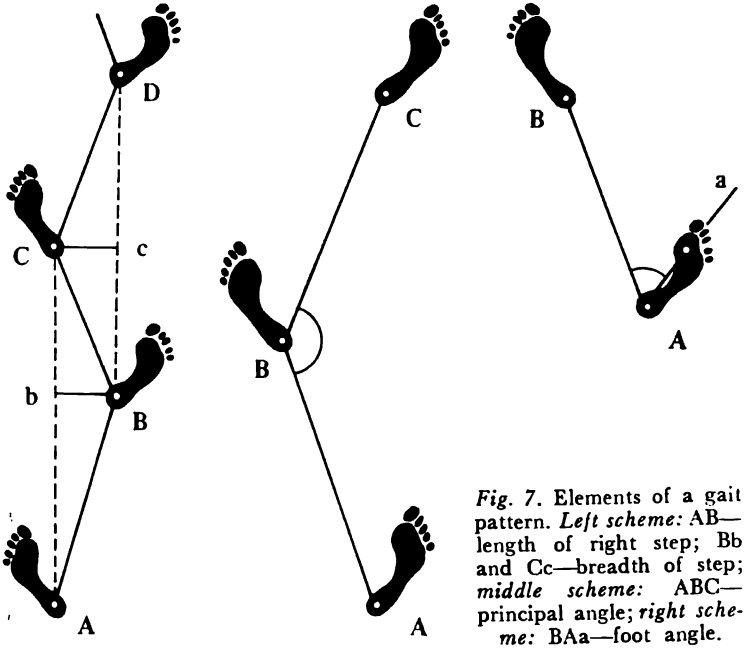

Fig. 7. Elements of a gait pattern. *Left scheme:* AB—length of right step; Bb and Cc—breadth of step; *middle scheme:* ABC—principal angle; *right scheme:* BAa—foot angle.

The size of the footwear belonging to the man who left the print may also be determined by either the bare foot or sole size.

To solve identification and diagnostic problems, investigators study not only individual prints, but also the so-called gait pattern, the name applied to the chain of successive marks of the left and right foot.

The gait pattern (see Fig.7), reveals the right step length, left step length, breadth of step, principal angle, and foot angle. A combination of these interrelated linear and angular values reflects the dynamic stereotype that shows person's gait. Yet, one cannot identify a person merely by the gait pattern, since it reflects only common (group) marks.

The gait pattern allows to establish whether the prints were left by a man or a woman. The average length of a male and female step is 75-78 and 65-68 cm., respectively, with possible exceptions, of course.

A gait pattern can also establish whether the criminal was lame, using crutches or sticks, carrying something heavy, moving in the dark, and so on. And all this information is used to search for him.

A combination of prints may be highly significant for investigating crimes and exposing criminals. A murder was committed in a remote Latvian village. Two criminals broke into a house at night, stunned the woman with a blow on the head, and ordered her husband to show them where he had hidden his money. The man took them into the courtyard and tried to escape, but the criminals caught and killed him. The footprints of three persons were discovered at the site of the murder. Having excluded the victim's footprints, the investigator established that the murderers' prints were left by rubber footwear, and some of them clearly showed the sole patterns. The gait patterns led to the nearest forest. One of them was formed by odd footwear: the left prints had a herring-bone pattern, and the right ones—a check pattern.

When the woman regained consciousness she testified that she had recognised one of the assailants as M., a young man from a neighbouring village. When the militia searched his home, they found rubber boots, whose sole size and pattern coincided with the marks left in one of the chains of footprints at the site of the crime. M. admitted that B. was his accomplice in the assault and killing; however, the latter denied this, and the boots

confiscated from him by the militia differed in size and pattern from those which had left odd marks at the site of the crime. There were no other boots in his house. At the same time, however, other characteristics of his gait pattern coincided with those at the site of the crime. Only some time later did the police discover that B. had asked one of his neighbours to lend him rubber boots for several days, while his were being repaired. The day after the crime, B. returned the boots and his neighbour informed the police and gave them a pair of odd boots, one boot with a herring-bone pattern, and the other with a check pattern. Experts had no difficulty in identifying them by the common and specific marks of the traces at the site of the crime.

5. TOOTHMARKS ARE IMPORTANT

A criminal may leave his toothmarks on food products (cheese, chocolate, fruit, etc.) and on other objects (bottle metal caps, lead seals, etc.). Toothmarks may also be found on the body of the criminal or his victim.

Marks of *bites* and *bite-offs* are distinguished by their form-

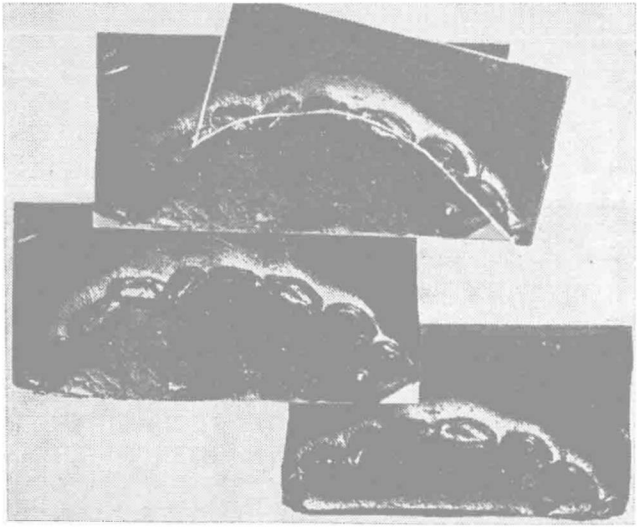

Fig. 8. Toothmarks: *below*—those revealed at the scene of a crime; *centre*—control sample; *above*—matching of a toothmark with the sample.

ing mechanism. Bites involve incomplete closure of the teeth and result in the forming of marks on the opposite surfaces of the object to reflect the chewing surface of the upper and lower teeth and some sections of their lateral surface (see Fig.8).

Bite-offs involve complete closure of teeth and separation of the bitten-off portion from the whole. Bite-off traces are dynamic and remain on the object from which one bites in the form of grooves that repeat the configuration of the outer tooth edges. The bitten-off section reflects the traces of the teeth inner surface in the form of bulging arched bands.

Bite marks are most suitable for identification, since they are more informative. Volumetric as a rule they reveal the following common and specific marks of the dental apparatus, namely the shape and size of the curve; asymmetric right and left sides of the dental row; tooth inclinations; the distance between the teeth in the row; shape of teeth (of their chewing or cutting surfaces); position in dental row; size; contour of chewing or front surface and presence and form of prosthetic appliances (crowns, fillings, etc.).

These common and specific marks combined with functional marks (type of occlusion) can help to identify the person who had left the trace.

At the same time, the dental apparatus marks reflected in the traces could also be used to search for wanted persons. Such marks would be: presence of crowns, artificial fixtures, anomalies of individual teeth, very big or small size of teeth and so on.

Once there was a case where metal caps from beer bottles were discovered with toothmarks on them. Casts of the suspect's teeth were made and used to make exact copies of his jaws. The jaws were then secured with a joint, and this unique appliance was used by experts to open up beer bottles. The resultant conclusion left no doubt of the fact that that very suspect had opened up the bottles with his teeth at the site of the crime. Ironically enough, he took care to take away the bottles, but forgot the caps.

Toothmarks may be the subject of not only criminalistic, but also of forensic medical examination—when they are left on a human body, either that of the victim or the criminal himself.

In addition to human toothmarks, investigators occasionally have to deal with animal toothmarks, and there have been cases

when the latter were mistakenly taken for traces of human activity.

At a Soviet swine-breeding farm, healthy piglets were refusing to eat on their third or fifth day after birth and soon died. Over 700 died in three weeks and post-epizootic inspection revealed fresh tongue wounds. In some piglets, the tongue ends were absent altogether, and in others the tongue showed dotted injuries resembling the trace of some special clamping device. An expert commission concluded that the absence of tongue ends in the piglets had resulted from mechanical interference by man. A criminal investigation was started, and the investigator with a group of militia operatives went to the farm. However, a subsequent inquest discovered nothing that could cast light on the events. So the farm management appointed several of its employees to keep watch and ensure that no one trespassed on the premises. But the piglets continued to die. All were found to lack the tips of their tongues and many showed signs of some clamping object or tool. Then the farm management organised additional security measures and veterinarians also joined in keeping vigil over the piglets.

This is how one of the veterinary surgeons described the events he witnessed.

"Somewhere around 11:00 p.m. I started my vigil. To begin with, we examined all the piglets in sty No. 51 to find their tongues intact. After midnight we noticed as many as 30 or 40 rats in the sty. They behaved very cautiously. On hearing some strange sound or seeing a shadow on the wall, one rat would squeak shrilly, and the lot would disappear... After midnight, the sow began feeding the piglets. She would lie on the straw on her side, and the piglets would settle along her teats. Rats would instantly appear in the box. They would climb onto the sow and sit 7-9 cm away from the heads of the sucking piglets. As soon as a piglet would lose the teat, the rat sitting opposite him would climb down and offer its snout. In search of the teat, the piglet would bump into the rat's snout with its mouth. At that moment, the rat would abruptly press the piglet's snout to the floor; the piglet would slightly squeak and then quiet down. Another rat, without waiting for the piglet to let the teat go, would run up from behind and, pulling it by the tail, draw it away from the teat, and then dash forward and offer the piglet its

sharp snout. The piglet would stretch forward, grab the rat's snout, and momentarily squeak. When the observers made noise, the rats would disappear. Examining the piglet, we noticed it lacked the tip of its tongue and the remainder of the tongue showed two puncture wounds left by the rat's sharp canine teeth. The wound was the same as in the piglets that had died earlier." It turned out that the marks left by the rats had initially been taken for the marks of some tool.

6. NAIL MARKS AND NAILS AS OBJECTS IN THE STUDY OF CLUES

Nail marks are frequently observed on the bodies of victims or criminals. In examining and studying nail traces, one should remember that nails lack sufficiently pronounced specific marks that might be reflected in those traces. Moreover, nail traces on the body could also misrepresent the common nail marks, e.g., configuration and/or size because of the characteristics of the skin's anatomic structure.

At the same time, depending on the location, number and visibility of nail marks, one can discover some of the circumstances of the event, namely, whether it involved self-defence or suffocation, what was the specific method of inflicting injury, etc.

Nail marks must be photographed and described in a report to specify their location, number, shape and size.

If it is thought that the detainee may still have under his nails pieces of skin (epidermis) from the body of the victim or some other foreign matter from the site of the incident, the under-nail content should be cleaned out and the nails clipped. The sample is then sent for forensic biological examination. In noting that nail marks have zero identification value, it should still be remembered that the nails themselves can be identified by their separate pieces.

William Idjirica, a resident of Nigeria, complained to the police that a certain Marcus Edishot had defrauded him of his car, typewriter, stereo and money. Concerned about his wife's health, William had turned to Marcus for advice after people had recommended him as a "professor of natural medicine". According to William's testimony, Marcus had agreed to connect him directly with "spirits" who would counsel him not only

about his wife's health, but about his own as well, which he was even more concerned about.

A series of rendezvous with "spirits" followed during which William was persuaded to give up his belongings and money to Marcus (the alleged "representative" of the spirits) on pain of death. In addition to the above-mentioned items and money, William was told by the "spirits" to give Marcus some of his own hair and bits of nails.

Marcus wrote the "spirits'" instructions on sheets of paper, using lime-tree juice mixed with some unknown powder as sympathetic ink. Thus, the text remained invisible while the paper was dry, but when it was shown to William in a vessel filled with water the "spirits' message" was revealed and they began to "talk" to Marcus.

In searching Marcus' flat, the police discovered small packages with hair and nail clippings. Together with samples of William's hair and nails, they were sent for criminalistic and forensic medical examination. The results indicated that the hair found during the search was similar in colour and microstructure to William's. It also coincided in density ingredient. To study the nails, out of the two clippings found during the search the examiners took the clipping whose shape and size clearly indicated it was taken from the big toe. By comparing it with part of William's big toe nail, they established that the two clippings were previously one whole (the external corneous crests fully coincided).

7. OTHER TRACES FROM THE HUMAN BODY

Lip, nose, forehead and ear traces form at contact with solid smooth surfaces, more often on window panes. If the trace is sufficiently large to reflect the totality of marks, it may be used to identify corresponding skin sections.

The following case was reported in Belgium. From July to December 1968, the criminal police in Charleroi were investigating a whole series of major robberies committed under aggravating circumstances. A study of these crimes, especially of the methods involved, revealed that all the robberies were interrelated and ostensibly perpetrated by the same persons. After a lengthy search, the police finally found and arrested the criminals, who

pleaded guilty to almost all of the offences. In addition to the main two persons accused, they also exposed their accomplices who had taken part in some of the crimes. One of them was a certain K.M.

After all the gang's crimes were exposed, there was still one major burglary in a pharmacy that all the accused claimed they had nothing to do with. It was the Charleroi Criminal Police's Laboratory of Forensic Examination that helped solve the crime. A laboratory expert discovered at the scene of the crime two earmarks on the window and door panes. Clearly, the criminal had pressed his ear to the glass trying to find out whether there were people in the pharmacy. The pane had distinct imprints of his left and right ears, and they were carefully recorded.

After the suspects were arrested, the investigators were faced with the questions of whether those marks belonged to one of the accused. The lab researchers decided to take the men's auricle prints in conditions maximally close to those in which the burglar had left his marks. The imprints on glass plates were photographed and compared with those from the scene of the crime, not only for the general shape and size of the ear but chiefly for the characteristic features of the auricle. It instantly became clear that not only the convex parts of the ear but other details of the auricle had been in contact with the pane.

The investigation revealed that K.M. had left his ear marks on the pane, and he could do nothing but plead guilty.

Polish criminalists by the name of Kosiel and Niedzwiedz experimentally proved that the folds and wrinkles on the skin of various sections of the human body form complex and stable patterns indicative of their individuality.

These conclusions are also confirmed by the studies of the Hungarian criminalist Baconyi in identifying the nose and forehead by their traces on glass. Baconyi cites two cases from his own practice. In one instance, of seventeen suspects sixteen were excluded by their forehead and nose prints. In another case, a forehead mark left on a glass door was used to unmistakenly identify a criminal.

Japanese criminalists conducted a major study to reveal the possibility of identifying people by their lip marks. In analysing the lip impressions of 1,364 people (including 607 women), no grooves and wrinkles were found to recur. Pattern stability was

checked for a lengthy period of time. As a result, the Japanese criminalists concluded that identification by lip is as authentic as by fingerprints.

Similar conclusions were also made by the Hungarian criminalist Ilinàr, who believed that conclusive identification by lip traces was possible when using the following specific marks: general character of pattern; beginnings and endings of wrinkles; their intersection, branching, and convergence. Similar expert examinations are also performed in Soviet institutions.

Clothes marks (traces of clad body sections) may be revealed on the painted surface of vehicles which have knocked down pedestrians, on loose soil (where the criminal and victim scuffled), and on other objects at the site of an incident. Clothes imprints may show the kind of fabric, the type and pattern of thread interlacing, the thread width and other common marks. The most informative are the marks with imprints of clothes seams. They reflect the convergence of threads from different pieces of fabric to result in a totality of specific marks of accidental origin that can individualise the clothes in question.

Clothes marks are photographed with a scale-ruler laid at the side of them to establish the exact dimensions in later study and described in a report. Clothes marks on painted surfaces are copied on a dactyloscopic film. Plaster casts are made of volumetric traces (on ground and/or wet sand).

The clothes of the person under examination are sent for study together with the photographs and trace copies.

8. CRIMINALISTIC STUDY OF BLOODSTAIN FORMS

Bloodstains represent trace-substances. In our case, however, the question concerns the criminalistic significance of bloodstain forms, not their biological study, which falls in the sphere of forensic medicine. Bloodstain shapes depend on the conditions in which they originated. Hence, their examination with reference to the study of clues makes it possible to establish their formation mechanism. When the investigator knows the conditions in which the bloodstains originated, he can, taking into account other evidence, get an idea of some of the facts in a given crime.

Bloodstains are distinguished in the form of pools, splashes, drops, streaks, and blots.

Pools form in sites of significant blood accumulation, and their presence is indicative of damaged large blood vessels or multiple body injuries. Pools indicate the location of the victim, and whether the latter was dragged from place to place.

Droplike bloodstains form when blood particles freely fall. Drops that fall from a low height (15-20 cm) have a circular shape. As the height increases to 50-60 cm, the form of the drop-stains becomes uneven (prickly edges). If the drops hit a surface from a height of over two metres, the edges become jagged, and additional "exclamation mark" shaped stains spurting from the main stain in all directions appear around the latter. If the drops fall in an oblique direction against a surface upper section of the stain appears rounded and the lower—ray-like. The stain itself is slightly elongated. When drops fall from a moving object, e.g., a moving person, they resemble exclamation marks the pointed ends of which indicate the direction of movement.

Thus, by drop stains one may determine from approximately what height and at what angle the drops fell, and whether the wounded person was moving or motionless.

Blood splashes occur when arterial vessels are cut and blood gushes out under arterial pressure: they may be produced by swinging or shaking a blood-covered object or criminal weapon or an injured limb (e.g., an arm, head) or by striking at blood accumulations, like a pool of blood or smashed head with hair soaked in blood. Blood splashes may fly in different directions, and their form may be both rounded (on hitting a perpendicular surface) and pointed ("exclamation mark") on hitting a surface at an angle of less than 90°. Splash sizes may vary from fine-dotted to several millimetres wide.

Splash bloodstains are used to locate their source; the distance to the receiving surface; and their most likely cause.

Blood streaks occur when blood trickles over the surface of a body or clothes. The lower end of the streak is stained more intensively than the upper end, and may have a droplike form. Streak directions indicate the position of the body and also the blood source. Changes in the direction of blood streaks over garments or body indicate that the position of the body had been altered.

Blood blots may be subdivided into smears and imprints. Smears refer to indistinct marks, dynamic as a rule, e.g., a smeared

mark left by a moving hand. Imprints are static marks left by bloody objects, e.g., the impression of a finger pattern (superposition mark), imprint of criminal tool or weapon (hammer or dagger). Imprints reveal certain features about the object that left them on which one should look for bloodstains.

Bloodstains make it possible to reconstruct a significant part of a given crime, for instance, where the victim was injured, and the possible nature of that injury; whether the crime involved a scuffle or self-defence; whether there might be bloodstains on the criminal's clothes and body; in what direction the victim was moving, or where his body was moved to; the victim's position at the moment of injury and later; and other circumstances.

9. HABITUAL ACTIONS: AN OBJECT OF INVESTIGATION

Knots and cigarette butts found at the site of a crime may also be used for the study of clues as trace-objects. They could, in fact, reflect certain habits inherent in a particular person or group of persons.

Non-professional and professional knots are to be distinguished. Professional knots include the fireman's knots, seaman's knots, fishermen's bend, weaver's knots, etc. A person who possesses a professionally or otherwise developed knot-tying habit would normally act instinctively, according to a certain dynamic stereotype.

Quite probably, when a criminal has to tie a knot while perpetrating a crime he would unintentionally tie the one he is used to tying. The presence of a professional knot at the site of a crime helps the investigator in his search for the criminal among persons belonging to a specific professional group.

Cigarette butts found at the site of the crime may help determine some specific smoking habit, e.g., clenching the cigarette filter with one's teeth, etc. The marks reflecting some specific smoking habit could determine approximately how long the person in question was present at the site of the incident, and whether the smoking manner of the person who left a cigarette butt coincides with that of some particular person.

By examining knots and cigarette butts, one can learn something of the smoker's habits and use this evidence to search for the criminal. As far as identification value of knots and cigarette

butts is concerned, the expert examination of them can only serve to help establish to what group the criminal belongs.

10. BREAK-IN TRACES

In the study of clues, the scrutinisation of traces of break-in implements, tools and production mechanisms is called mechanoscopy.*

When we speak of implement and tool traces we basically mean those used for breaking down barriers. In this case, a break-in implies penetration into a locked storage, e.g., building, cabinet, or safe, by fully or partially destroying the locking device, wall, ceiling, floor, window, or some other obstacle.

Break-in implements used by criminals may be classified into:

(1) those specially designed for break-in purposes;

(2) general-purpose tools and implements, e.g., those for cutting metals; and

(3) those incidentally available at the break-in site, e.g., iron strips, metal rods, pipe piece, etc.

All the tools and implements, no matter to which of the three categories they belong, may be subdivided into mechanical and thermal.

Mechanical tools and implements would include striking, cutting, chiselling and drilling instruments, while thermal ones include gas and electric-arc metal cutters and welders.

No matter where and in what conditions break-in traces are left, depending on the manner of use and type of tool (instrument) they are subdivided into (a) pressure traces; (b) sliding (friction) traces; and (c) cutting traces.

Pressure traces result from striking (pressing) some tool against the surface of the obstacle to be broken. If the receiving surface (obstacle) is sufficiently hard, a surface trace would remain. If that surface has residual strain, a depressed trace (dent) would form. The dent depth would depend on the strength of the blow (pressure), and its form would repeat the configuration and size of the tool used in the break-in. Having studied this

* Sometimes, traces of vehicles are also included in mechanoscopy. However, in recent years, this field has developed into an independent section called the *study of transport clues.*

trace, the investigator could get an idea of the form and size of the tool that was used and, based on this evidence, formulate how to look for it.

Sliding (friction) traces form when the break-in tool (crowbar or iron strip) is applied to the obstacle surface at an angle. In this case, both scratches (scrape-offs) and consolidations may form. Friction traces become more distinct with the increasing hardness of the instrument used in the break-in in comparison with an obstacle. Friction traces help determine the type of the tool and the break-in mechanism.

Particles of the obstacle substance (paint and/or material) revealed on the criminal tool, i.e., trace-substances have major significance both in pressure and friction traces.

Cutting traces are most frequently observed on wooden and metal obstacles. These are axe, knife, chisel, scissors, nippers, and other similar tool marks. *Sawing traces* are a type of cutting trace. Also, *drilling* and *planing traces* have a similar mechanism.

Cutting traces reflect the cutting (striking) tool edge. As a rule, they are dynamic (linear), i.e., where every point of the

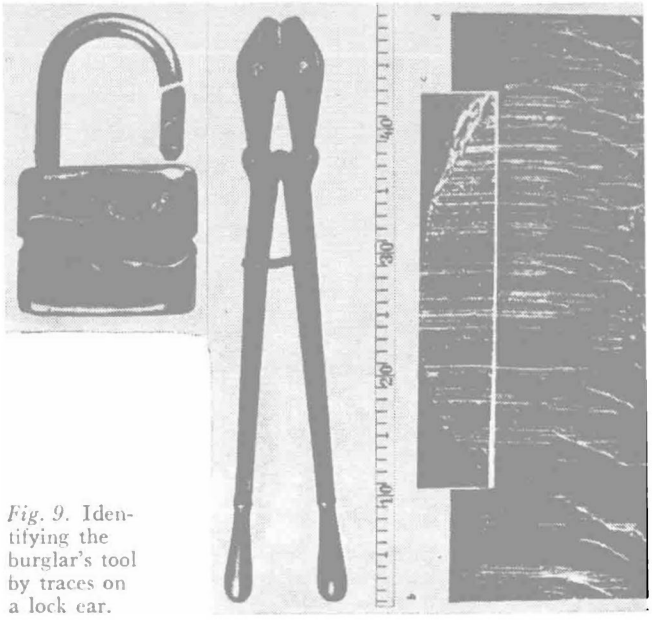

Fig. 9. Identifying the burglar's tool by traces on a lock ear.

working plane leaves a line. Alternation of the resultant grooves and ridges (line) reflects the microrelief of the forming surface. Microrelief irregularities are of an accidental nature and, for that reason, their totality represents an individual complex (see Fig. 9).

Traces of thermal effects form chiefly in breaking metal obstacles, such as safes, steel doors and guard gratings. The use of gas or arc cutting to break down some barrier is revealed by characteristic marks of metal separation, partial fusion of marginal sites and the presence of fused metal drops.

An analysis of traces (expert examination inclusive) at the site of a crime makes it possible to determine the type of break-in (by breaching, sawing, etc.,); the break-in mechanism (sequence of trace formation); the break-in direction (from outside or inside); the type of tool used; the number of persons taking part in the break-in; the criminal's height and physique; whether the latter had some experience in using the tool (or instrument); the time needed to break the obstacle; what traces (of what substance) may have been left on the clothes and body of the burglar, e.g., in his trouser turn-ups, shoes, under his nails, in his ears or hair.

Expert examination of break-in traces with the purpose of identification helps determine: the group (kind, type) of instruments to which the object used belongs; whether the specific tool left the break-in traces; whether the break-in traces were left by one or several tools; whether the traces were left on different obstacles (in different places, also when committing different crimes) by the same tool; and the type (kind) of instrument (tool) found at the site of the crime.

The investigation may call for the need to study the traces not only of the break-in and criminal tools but of any chance object that could be related to the event in question.

11. TRACE-OBJECTS

Locks and locking devices, mass production items and fragments of objects are assigned to the category of trace-objects.

If they were discovered at the site of a crime, and their initial state has been altered, or if they have some other relationship with the crime, they should be subjected to a study of clues.

In studying these objects, the main objectives should be:

(a) to determine the object's state and the methods used to destroy or damage it;

(b) to establish the origin of a mass production item by studying the marks of production mechanisms; and

(c) to establish the whole by its parts.

Locking and guard devices, namely, locks and seals, are the ones most frequently subjected to expert examination involving the study of clues.

In an overwhelming majority of locks, the main element is the span piece, which acts as a catch. Indeed, in the final analysis, locks are opened by shifting the span piece. To make it difficult, and to exclude the possibility of a lock being opened by an object other than a corresponding key, lock-pins, springs or cylinders are inserted into the locking device.

A potential burglar would either unlock or break the lock. But he could also do both at the same time. To unlock it he would use specially fitted keys, skeleton-keys, and other objects. There are three basic ways to open locks:

(a) through the keyhole by directly affecting the lock mechanism (span piece, spring, lockpins, and joint-pins). This may be done by a fitted key, skeleton-key, or some other object;

(b) by acting on the span piece from outside; in this case, the protruding section of the span piece is pressed with a solid flat object (screwdriver, knife edge, or metal plate);

(c) by turning the key left in the lock inside the room; the key end would be caught from outside with special pincers or a slit pipe.

A study of unlocking techniques and traces on the outer and inner surfaces of the lock can help determine the criminal's knowledge of the lock design; of the items that he used to open the lock, such as keys, skeleton-keys, or other objects; and other circumstances.

A burglar breaks a lock by separating it from the spot to which it is secured, or by breaking it apart. If the lock has been separated from its secured position, the investigator should chiefly pay attention to the break-in tool traces, such as sawing, pressing back or drilling marks.

A padlock could be broken apart by destroying its case, say, by cutting off the rivets or separating the cover; by sawing up or nipping the ear; or by tearing out the latter from its secured

position. In all these cases, the lock parts and door sections adjacent to the lock would bear marks of slashing, pressing-back, and/or pressure (blows).

A burglar could destroy the lock cyliner, lock-pins or coding device by either drilling or breaking it out. He could also destroy the lock by breaking off, tearing out, or twisting the span piece.

In examining a broken lock, an investigator should first establish the opening (break-in) mechanism and then, taking this into account, reveal and record the traces to determine the type of tool used.

Together with the lock, he removes the broken-off parts, filings, etc. The investigator should never try to manipulate (unlock or lock) the lock mechanism, since this could change its state and cause new traces that would make subsequent expert examination impossible. Both the lock and the assumed break-in tool as well as keys should be sent for expert examination.

Seals also figure as mechanoscopic objects in the study of clues. Seals made of lead, tin, plastic materials, aluminium and other substances are hung on doors of storages, goods vans, and containers, and on expensive furs, carpets, etc. Sealing is achieved by securing the seal with twine or wire and pressing it with a special device that leaves a definite impression (of letters, figures, or signs) on the seal surface.

Generally, burglars break a seal by widening the holes on its lateral surface and extracting (running through, or tearing) the wire or twine. They then replace the wire or twine in the seal to press it again. Keeping this in mind in inspecting a broken seal the investigator should chiefly pay attention to searching for traces of outside effects on the seal body. The broken seal, together with intact seals made of the same material, the twine or wire and the sealing device or instrument used therefore should be sent for expert examination, the said intact seals, twine or wire for experiments, and the sealing device for identification.

12. WE LIVE IN A WORLD OF STANDARDISED PRODUCTION

In addition to traces of tools and instruments, traces of production may also be objects in the study of clues. In fact, machinery traces are most frequently involved when mass production items figure as investigation objects. These may be highly di-

verse articles, e.g., nails, buttons, cigarettes, ropes, wires, machine parts or any half-finished products.

The need to examine mass production items could arise in investigating all kinds of crimes. For instance, in investigating robberies, one must establish whether the stolen goods correspond to those manufactured at a specific enterprise during a definite time period.

Mass production items may also figure as material evidence in investigating murders, armed assaults, rapes, and so on. For example, when an investigator discovers a button at the site of a rape, he must establish whether or not it is similar to the buttons on the suspect's clothes. To cite another example, the electric cords with which a murdered man's hands were tied would be compared with those found on searching the accused's home.

The main problem to be solved in the study of clues involving mass production items is establishing their source and group affiliation. Normally, the investigator would seek to learn: (a) whether a given item has been produced by some specific machine tool; and (b) whether or not items revealed in different places belong to the same batch.

In the first case, the object to be identified is a certain production mechanism. In the second case, the investigator must establish the fact that several items were manufactured using the same unknown production mechanism.

To establish the common source of mass production items, the investigator may use marks of the initial raw material, marks of production machinery and marks of service or storage.

With regard to the study of clues, marks of production machinery would have maximum significance. Other marks are concomitant and essentially represent features of some material or substance.

Marks of production machinery reflect the production process used in manufacturing an item of the given type. These are traces occurring on products from, say, dies, press moulds, punches, blanking devices, cutters and so on. These and similar devices can reflect marks of their outer contours on surfaces more pliable than their own. As a result, the items (half-finished pieces) show various volumetric and surface traces of pressure, cutting and/or friction. Surface traces occur from stencils used to mark goods (cigarettes, electric bulbs, etc.). The contours of

the inner and outer surfaces of a headlight lens, reflecting those of the punch and die with which it was made, is an example of volumetric traces.

In the course of operation, the working elements of production machines could undergo certain changes through partial replacement, wear and/or sharpening, and some of the marks reflected on a given item could also change accordingly. The investigator should take this into consideration to help narrow the group (batch) of articles that a certain item might be affiliated with.

If in the course of expert examination there is need to establish that a given article has been manufactured by some specific production machine, the expert should be given samples of items made by that machine. The samples should be taken from a batch manufactured simultaneously with the object under investigation.

The evidence obtained in inspecting and scrutinising mass production items helps establish the quantity of the corresponding group or batch and, by tracing their distribution paths, to check the persons who used them.

One aspect of mechanoscopic identificational study of trace-objects is the establishing of the whole by its parts.

A whole object could be a separate item, e.g., a headlight lens, a jacket with a torn piece of fabric, etc. A set of items with marks of their joint use, e.g., the car outside rear-view mirror and its securing bracket and knives and sheaths, would also be such objects. Elements of the same aggregate, e.g., vehicle parts that have come loose to remain at the site of an accident, are considered here as well.

In moving from one Soviet town to another, G. sent off some of his belongings by a goods van. On receiving them, he first failed to carefully check the packaging, and when he brought them home and opened the case he found some things were missing. He lodged a complaint to the militia, who decided to inspect the storehouse where the consignee had received the case with his baggage.

When inspecting the storehouse, the militia found in a heap of rubbish a piece of metal ribbon with break-off marks, and also two small cardboard cases for medicines, one of which was numbered 475107. G. declared he used to keep his medicine in

precisely such cases; but one medicine bottle had been lost and the other arrived without a case. To confirm this, he showed the militia a full flask No. 475107. This established the fact that the flask belonged to one of the cardboard cases. On searching the house of one of the warehouse men, the militia found the items stolen from G., among them a flask (No. 025028) with medicine. This showed that it belonged to the second case. Finally, criminal experts established that the piece of metal ribbon found in the warehouse, and the ribbon used for packing the wooden case with G.'s baggage were formerly one whole. The experts arrived at this conclusion having become convinced that the separation surfaces of the two items fully coincided.

The illustrational qualities of an expert's conclusion are of major significance in an expert examination designed to establish the whole by its part. Photographic tables appended to the expert's resolution can clearly show the coincident marks of the object's parts.

A study of clues involved in establishing the whole by its part should be supplemented by studies of materials (study of the composition of the substance from which the object is made, its surface coating and so on, and the study of an object's physical properties, such as reflectance, electric conductivity, hardness, structure and so on).

13. TRACE-SUBSTANCES

The main purpose of trace-substance studies is to establish a possible link between substances revealed in different sites to thereby indirectly show the implication of some person or object in a specific event.

The well-known French criminalist Edmond Locard devoted many years to studying dust, and his knowledge in the field was truly encyclopaedic.

Once a man suspected of coining false money was brought to his laboratory. Locard treated his clothes with a vacuum cleaner of his own design to reveal a few distinctive features in the dust composition, namely, a mixture of tin, stibium and lead, the favourite metals of counterfeiters the world over. The suspect failed to give any satisfactory explanation to the simultaneous presence of three metals and was totally at a loss when

Locard stressed that their proportion in his clothes corresponded to that in the fraudulent coins.

Not long before, Lyons' postmaster's office was piled up with complaints about lost registered letters containing money and money orders. For quite a while they failed to uncover anything, even though they suspected that the letters were being opened at some French post office. The detective in charge of the case was struck with the idea that the criminal, whoever he or she might be, could open them in the WC, the only place where he or she could stay alone. The detective hid himself in a small room above the WC and began to peep through a small opening in a floor board. Soon one of the post office officials appeared and began to open up letters and stack his pockets with money and money orders.

The detective could see only the official's nape, by which he naturally could not identify him. So he picked off a piece of plaster and dropped it down on the man's shoulders. On hearing noise the man instantly disappeared.

The jackets of all the post office officials were then submitted to Locard for examination. The fifth one revealed signs of plaster, even though it had been carefully brushed. Locard casually asked why the dust was there, and the official to whom the jacket belonged hysterically yelled that his colleagues had betrayed him and admitted everything.

Normally, a large amount of dust accumulates under the nails, where one can always reveal a professionally manufactured product: a confectioner carries sugar, a type-setter ink, and a pyrotechnist saltpetre and sulphur. In another instance, dust inherent in mink pelt proved enough for Locard to expose a man suspected of a fur robbery. Incidentally, the ear auditory canal, trouser and jacket cuffs and pockets are equally good dust "storages".

14. TRACKS OF MOTOR VEHICLES AND OTHER TYPES OF TRANSPORT

The study of transport clues is part of the general study of criminal clues that deals with a set of tasks to be solved by examining different traces that occur when using vehicles. The following vehicle traces have criminalistic significance: (a) under-

carriage tracks; (b) traces of projecting elements; (c) parts and units that have come loose (trace-objects).

Undercarriage tracks are left by vehicles which travel without the use of rails, e.g., automobiles, motorcycles, bicycles, tractors, carts, and sleighs. Naturally, today experts in the study of clues chiefly examine automobile undercarriage tracks, the evidence for which, incidentally, would also hold good for other vehicles, e.g., motorcycles and tractors.

Depending on the state of the wheels at the moment of trace formation, we differentiate rolling and sliding traces. The former occur as a result of the wheel's translatory-rotary motion, braking and slipping, and the latter—at complete blocking of wheels during braking, and also at slipping of a rotation wheel.

The mechanism of rolling traces is similar to that instrumental in forming static traces. Every tyre point leaves a trace. However, translatory motion results in some deformation, with which the protruding elements smooth out the track edges on emerging therefrom, and enlarge the track size and diminish the traces of the gaps between protrusions.

Depending on the properties of the receiving surface, the undercarriage trace could be either surface or volumetric.

The investigator uses undercarriage traces to determine the direction and mode of motion (breaking, stoppage) and type (model) of the vehicle and, in the most favourable cases, individually identify it. In fact, when searching for a vehicle, it would be highly important to determine its type (model) and the direction in which it was moving.

In distinguishing lorries and passenger cars by their tracks, one should take into consideration the presence or absence of coupled back wheels, the size of the automobile base and the track width.

The track width is the distance between the centre-points of the left and right back wheel tracks, or between the clearances of the coupled back wheels. Significantly, a motor vehicle which travels in a straight line chiefly leaves the tracks of the back wheels which overlap the front wheel imprints either partially or fully.

The automobile base is the distance between the front and back wheel axles. In semitrailers, we would distinguish the au-

tomobile overall base (distance between first and third axles) and bogie base (distance between second and third axles).

The automobile base should be measured either where the vehicle stopped, leaving distinct and deep tracks, or where it has turned and reversed.

Having established the type of vehicle, we should determine its model. To that end, in addition to previously established marks (base and track), we may use such marks as the width of the tread running surface, tread pattern and full wheel diameter.

The width of the tread running surface should be measured at a site bearing a distinct pattern impression, from one edge to the other. The tread pattern (form, cluster spacing and size of wheel cleats) reflected in the track must be photographed; then all the pattern elements should be measured and the dimensions duly recorded. After that, either through consultations with specialists or using reference data, it should be possible to determine the model or group of models to which a given track width and tread pattern belong.

With the aid of successive mark being reflected in the track (crack, patch or stone stuck between wheels), the length of one wheel turn can be measured, i.e., its circumference, in order to calculate the wheel full diameter. This is accomplished by the formula $D_f = \frac{l \times 1.1}{\pi}$, where D_f is the full diameter; l, the circumference; 1.1, the tyre sagging coefficient; and π, the symbol for the ratio of the circumference of a wheel to its diameter, 3.14. The data for the wheel full diameter may be used to determine the tyre model and, together with other data, the vehicle model. However, in using this formula, one must take into account possible deviations from the mean value due to various factors, such as tyre pressure, vehicle load, running speed and type of soil.

In addition to marks characteristic of the standard group (vehicle model), other marks that might narrow that group are used to search for and identify the vehicle. These marks include patch traces; places showing characteristic defects (cracks and/or crumbled sites); pattern anomalies (production defects); and so on.

When found, a vehicle may be identified by the impressions

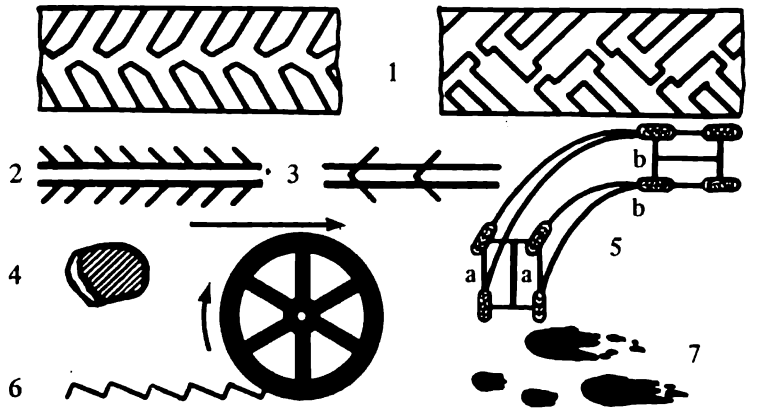

Fig. 10. Marks of the direction of movement.
1. Direction of the angles of tread pattern in tracks of tyres with high cross-country ability; 2. Location of dust near the track; 3. Location of ends of branches broken in running over; 4. Location of the gap near the stone pressed into ground when running over; 5. Ratio of track divergence angles (a) and track convergence angles (b) at turn; 6. Contour of track bed; 7. Liquid drops that fell from a moving vehicle.

left by tread defects.* To that end, the investigator uses common and specific marks, such as crumbling sites in the wheel cleat, cracks, swellings, patches, etc. Again, these marks are the form, size and location of the defect, and the totality of the minor pattern details. Given that normally front wheel tracks are overlapped by back wheel tracks, to get an idea of front wheel treads, the investigator inspects the curvilinear motion sites (at road turns).

In addition to helping to solve identification tasks, undercarriage tracks are also used for diagnostic purposes, e.g., to determine the direction and mode (breaking, stopping, etc.) of motion, since relevant knowledge is important both in searching for the car and in the subsequent investigation.

To determine the direction in which the automobile was moving, the investigator uses the track marks (see Fig.10). Braking

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* Normally, in such cases, the investigator would identify the tread, not the vehicle, and this is something to be remembered. In fact, the wheels may have been transposed from one vehicle to another.

is indicated where there is a less distinct reflection of tread pattern, a change of pattern or presence of transversal strips. If full braking had caused skidding tracks, the latter would be used by a traffic expert to establish the vehicle's speed prior to stoppage. The length of the back wheel tracks or the overall braking distance is measured and the size of the automobile base subtracted therefrom.

All the undercarriage track marks should be recorded in an on-the-site report.

If the investigator finds caterpillar tracks at the site of the incident, he should measure and record the track width (distance between centre-points of caterpillar tracks), the caterpillar width; the shape and size of the caterpillar links and the number, form, and size of the link cleat.

If the tracks were left by the wheels of a horse-drawn vehicle (cart or wagon), the investigator would make the same measurements as with automobile tracks. However, in assessing the results, he should remember that the measured track width could be slightly larger than the true one due to wheel displacement along the axle.

In addition to wheel tracks, the investigator also records the hoofmarks of the animals used. The imprints of hoofmarks (i.e., presence of horseshoes) make it possible to determine the animal species (horse, ox or camel), distinctive gait pattern marks, direction and type of gait (pace, trot or gallop), and common and specific marks of the hoof or horseshoe; under favourable circumstances these marks could help to identify the animal.

One early morning, the militia station in a mountainous district of the Caucasus got word that a group of villagefolk had been robbed. The people were riding in a grain-loaded lorry bound for a nearby market, and were suddenly overtaken by a Volga (Soviet-made passenger car) with its brake lights off and no license plate. After a while, they again saw the car at the side of the road, and four armed masked men on the road itself. The men told the passengers and driver to get out of the car and lie face down at the side of the road. They searched them and took away their money. Then two of the robbers kept guarding the lot, and two others left somewhere in the lorry. About two hours later, they returned in the same lorry, now empty. Then the four robbers climbed into their Volga and left. Nobody

could pursue them as they had pulled the spark plugs out of the lorry engine.

When the militia and a crime expert arrived at the scene, they discovered among other wheel tracks the distinct pneumatic tyre marks of a Volga. They photographed the most distinct samples and made plaster casts.

Then an operative group began to pursue the Volga. The car's tracks now disappeared, now appeared again, until they were finally lost in a large settlement, where the militia discovered that U., a resident of the village had a blue Volga. They also found out that U. had no permanent job and lived on incomes of unknown origin.

In the suspect's house, they found a Volga, whose tread pattern coincided with that at the scene of the crime. Also, one of the tread sites exhibited a chunk-out similar to the one established in the track and later plaster-cast. A subsequent check revealed that the car's brake lights did not work because a wire had been cut. The license plate was there; but careful inspection uncovered fresh marks indicating that it had been fixed anew.

The militia made skilful use of this evidence, and during the subsequent interrogation U. pleaded guilty and testified about his accomplices, all of whom were soon arrested.

Parts and units which have come loose, discovered at the scene of a crime, are used to search for and identify a vehicle, and also to determine the site of a traffic incident (collision or knock-down).

In this case, the objects left could be grouped as follows:

(1) fragments of headlight glass, organic glass, or other glass elements of a vehicle;

(2) flakes of paint;

(3) fragments of vehicle parts;

(4) component parts or clamps of individual units.

An examination of headlight and other glass fragments makes it possible to establish the type, model and make of the item and, thus, the vehicle model for which it was designed. Together with other evidence, this information is used to search for a given vehicle. If the examined vehicle had homogeneous fragments, they would be subjected to expert examination to establish the whole by the parts.

Flakes of paint that have come off a vehicle help establish its

colour, and this evidence may be used in the subsequent search. After the vehicle is found, the investigator calls on experts in the study of clues and of materials for assistance. A study of clues could establish the matching of pieces by their separation lines and uncover the sites where the paint used to be. A study of materials involves a comparison of the chemical and physical properties of the paint.

The parts to be secured on the outside of the automobile are the ones that figure most often as fragments found at the scene of the accident. They could include the wing (outside) rear-view mirror, aerial, blinker, door handle (projecting one), and other similar parts. If revealed, the shape, design, and purpose of a given part could help determine the type of vehicle and, subsequently, its model (and/or make). Once the vehicle is found, the investigators may be able to identify it by a part that has come loose. To that end, they compare by the separation surface the part found at the scene with the part element still intact on the automobile.

Besides helping to identify the vehicle parts and elements which have come loose (fragments inclusive) are useful in solving diagnostic tasks, chiefly in determining the exact spot of a collision, knock-down, or some other accident. This is highly significant, for it would permit one, in the final analysis, to determine how long a given object had been in the driver's field of vision, and whether the latter could have prevented the accident.

Traces of projecting elements of a vehicle are essentially contact interaction trace-reflections that form when two or more vehicles come into contact (collision); when a vehicle hits a victim's body or clothes (knock-down); when a vehicle runs over a human body; when a vehicle comes into contact with surrounding objects (posts, trees, walls, railings, etc.).

Traces of contact interaction are studied to identify a hit-and-run vehicle, and also to reconstruct the events of a traffic or some other accident, i.e., to specify what parts left traces, and in what sequence the traces were left.

Speaking of traces left by projecting parts of vehicles, one should also distinguish static and dynamic traces. Static traces form when the force of the impact is damped at the moment of contact. Volumetric static traces reflect the outer structure

of the trace-forming object (car part or element) in three dimensions. The impressions that could form in the wings, body or doors repeat the form of the parts that left them, e.g., that of the bumper, headlights, hooks, handles, and so on. At very strong impacts, the part passes through and leaves a rift that allows one to only approximate the size and shape of the original object.

Static surface traces do not change the form and integrity of the receiving surface, but reflect the outer structure of the part that left them in two dimensions, namely, in length and width. Surface traces form due to deposition of dirt, paint or lubricants or as a result of the separation (transfer, or removal) of particles from the receiving surface.

Dynamic traces occur in the course of continued motion of at least one of the colliding vehicles. In this case, the force of the impact is directed at a certain angle and may be greater than that of friction. Dynamic traces have the form of dents, cuts, scratches, scrapes, tears or deposits.

In analysing traces of vehicle collisions, the investigator proceeds from the premise that they could be:

(a) head-on (the vehicles are moving toward each other);

(b) passing (they are moving in the same direction); and

(c) angular (they are moving at an angle to one another).

A side sliding collision is a variety of head-on and passing collisions in which the vehicles virtually do not change the direction of motion (provided their bulk difference is insignificant). A type of angular collision is a cross collision (one occurring at 90°, i.e., when the longitudinal axles of the colliding vehicles are perpendicular.

Depending on the type of collision, traces are formed on the corresponding elements of the vehicles. In studying traces that may occur in a traffic accident, the investigator should first of all distinguish the initial contact traces from those of subsequent contacts (collision, overturning, etc.). The initial contact traces occur in a collision due to penetration of one vehicle into another. The initial contact is characterised by numerous dents and by metal displacement in a certain direction. Initial contact sites are determined by the locus of maximum unidirectional metal deformation.

Secondary traces are not strictly unidirectional; sometimes,

they are larger, e.g., at overturning, and are occasionally continuations of initial contact traces.

In analysing collision traces, it is highly important to distinguish their counter-pairs, i.e., vehicle sites that had interacted. The investigator distinguishes such pairs of traces by studying their shape, size and height above the road surfacing. Such an analysis makes it possible, as early as during an on-the-site inspection, to get an idea of the traces that one of the vehicles left on the other vehicle, and exactly with what parts. This is determined by the impression shape.

An expert examination of traces occurring in a collision of vehicles helps to establish the collision line, which represents the force vector sum with which one vehicle acts upon the other at the moment of collision, or rather at the moment of initial contact. By specifying the collision line the investigator may establish the relative position of the vehicles at the culmination of the traffic accident.

If the vehicle had fled the scene, the traces of its projecting parts could be used to determine the model, or to identify the car when it is checked.

Traces of projecting elements may be found on the clothes and body of a hit-and-run victim. Judging by the outer appearance, form and size of those traces and by their distance from the road surface, one might also establish the model or type of the vehicle involved. On detecting the latter, the investigator should carefully examine it in order to reveal fabric fibres, skin particles, blood matter, etc.

15. THE INCREASING ROLE OF MICROLOGY

Present-day investigations of various crimes, e.g., robberies, murders, rapes, armed assaults, etc., are coming to increasingly involve the study of microscopic traces, microscopic particles and microscopic amounts of trace substances.

Microtraces may be both small independent marks and individual fragments of micromarks. Small independent marks are usually scratches left by very small surfaces. For example, the metal parts of an attaché case might have scratches from a knife tip with which someone tried to open it. Microphotographs of these scratches could reveal minute traces from the knife tip's

unevennesses and make it possible to identify the knife by these traces.

In most cases, the investigator has to deal with microtraces when he studies them as part of macrotraces. He would start studying the former when the macromarks are insufficient for identification. For example let's assume that a papillary pattern imprint revealed only three or four macromarks, e.g., line convergence, beginnings and endings of lines, and line bifurcation. This is obviously insufficient for identification, especially since such marks occur frequently. In this case, the expert also begins to study micromarks. Here these include the presence, form and relative position of pores (poroscopy), and the contours of the beginnings, endings and edges of papillary lines (edgescopy). Then, by adding a considerable number of coinciding micromarks to coinciding macromarks, the expert should be able to identify the objects in question.

Another example might be when the impression of a shoe sole pattern on a sheet of white paper showed a very small section with several macromarks in the form of alternating rhombi that coincided with a corresponding site on the sole. Yet, in this case too, the number of macromarks was clearly insufficient for identification. So the expert started examining the micromarks to reveal that every rhombus in the sole pattern, previously a specific mark with regard to its form, size and location, has become a common mark. The unevennesses in the rhombus sides and microdamages (microscopic crumbled sites) in its corners, etc. have now turned into specific (in this case, microscopic) marks with relation to the common mark (rhombus).

Microparticles are understood to be objects none of whose three dimensions (length, width or height) exceeds 2 mm. They could also be objects in the study of clues designed to establish the affiliation of a particle to some definite object taken for a single whole (establishing of the whole by its part). The fact that microparticles are small in size does not prevent such an investigation; however, it requires special techniques and the use of magnifying instruments.

At the scene of a murder, the police found scissors, whose sharp ends had been used to inflict punctured wounds. The scissor handle rings showed partial peeling of the green plastic substance covering the handles and rings.

On examining the suspect's clothes, the police found two green microparticles (2×2 mm and 1×2 mm) in his jacket pocket. A microscopic study of the larger particle clearly revealed uneven edges, similar to the uneven edges on the scissor handle lacking part of the plastic coating.

Using a microscope, the expert combined the microparticle with the plastic coating site on the scissor handle. The two elements matched over all the microscopic unevennesses of the edges, and this was clearly revealed both in visual observation and in considerably enlarged microphotographs.

In addition to study of clues, microparticles should also be examined by methods used in the study of materials, i.e., by chemical, physical and biological procedures, to establish the substance of which the microparticle is made.

Microscopic amounts of trace-substances also have major criminalistic significance, even though they are not examined by methods used in the study of clues. Trace-substances may be of different origin and occur in microscopic amounts due to various factors, such as microamounts of substances left by the criminal at the scene of a crime, e.g., sweat and fatty secretions in fingerprints, construction dust from clothes and footwear, soil particles, etc. Microscopic amounts of substances that separated from vehicles may also occur, for instance, particles of fuel products, lubricants, braking fluid and/or surface coating. They could also be particles of paint that had either separated from/or stuck to a burglar's tool during a break-in. Fabric fibres from the victim's clothes might also serve as microscopic evidence when found on the criminal's clothes or his car seat.

During an on-the-site inspection, the investigator should look for microparticles and microscopic amounts of trace-substances on the criminal tools, clothes, footwear and body of the criminal and his victim; on things taken out of their pockets and from behind their trouser and shirt cuffs; on other personal belongings, e.g., bags, briefcases, umbrellas, etc.; on vehicles; and on obstacles the criminal broke through.

The search for microparticles (microscopic amounts of substances) is a two-stage process. First, the investigator should find and remove the items on which microscopic objects may be expected; then he must start to look for the microobjects themselves (not infrequently, in the laboratory).

Coming up with a working version regarding what microobjects should be sought, and where, is of decisive significance in the search. However, that version should be based on a correct understanding of the criminal event and the criminal's behaviour, tools, etc. Taking this into account, the investigator makes an assumption as to how the microobjects travelled: from the scene of the crime onto the criminal's clothes; from his clothes to the seat of some vehicle; from the victim's clothes to the criminal's clothes; etc.

An 18-year-old girl (K.) was assaulted in a big park. Someone had hit her on the head from behind; she fell down, but instantly jumped up and fled (she was wearing a fur hat which softened the blow). When the militia arrived on the scene, they found a rainsoaked wooden stick which had no visible markings, but, judging from other circumstances, may have been used by the attacker. The militia let the stick dry. A subsequent expert examination of the stick and hat established the presence of intercrossing particles. This meant that the girl was hit with that very stick. Two months later, the militia suspected R. of having been involved in the case. They took his clothes and sent them for expert examination. The expert established that the stick which the militia had taken when inspecting the scene of the assault had microfibres with generic features similar to those of R.'s jacket and raincoat and his raincoat left pocket, together with microscopic bits of mud therefrom. Despite the fact that R. had been wearing these clothes long after the event, both the inner and outer surfaces of the raincoat left sleeve up to the underarm area, as well as the left pocket, were found to have very small bits of wood identical to the stick material. It turned out that R. had put the stick into the left pocket of his raincoat, and the projecting part into the left sleeve, to hold it with his left hand. The expert's conclusions helped establish the criminal's actions and his involvement in the assault.

To reveal microobjects (particles, fibres, and/or substances), investigators use magnifying glasses with different degrees of power; magnifiers with illumination; strong light sources; and so on. Microobjects are examined in a room with closed windows and doors so as not to let microparticles be carried away by air currents. The examined objects are placed on a table covered with white, smooth (non-fleecy) paper or a cellophane film. An

expert or investigator examining the objects should wear a coverall and cap.

To take microparticles, the expert or investigator uses an adhesive tape, dactylofilm inclusive, soft brushes, sponges, tweezers, scalpels, portable vacuum cleaners with replaceable filters, magnets and/or dielectric rods.

The revealed and removed microobjects should be packed in clean test tubes, polythene bags and/or small hermetically sealed containers.

If an on-the-site inspection failed to reveal microobjects, the investigator should send the whole object, e.g., clothes, footwear and/or criminal tools, for more detailed inspection and subsequent expert examination.

By determining the nature and source of microobjects, the investigator could obtain valuable evidence concerning the criminal's or victim's occupation. He could also establish from which locality the criminal came; prove that the criminal had really been in some specific place; and establish that he had a contact with the victim's clothes.

Together with possibilities afforded by the study of clues involving microparticles and microtraces, the above-cited procedures have substantial criminalistic significance in revealing and investigating crimes.

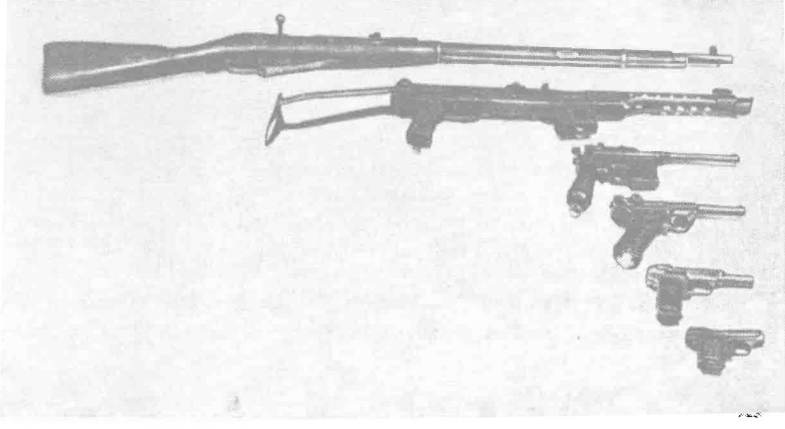

Fig. 11. Samples of models of hand firearms with different barrel lengths.

Chapter 4

FORENSIC BALLISTICS

1. FORENSIC BALLISTICS AND ITS SIGNIFICANCE IN EXPOSING CRIMES

The development and improvement of hand firearms has led to their extensive spread among people in many capitalist countries. In the United States, for instance, the population is in possession of over 200 million hand guns and the fact that they are readily accessible increases the chance that they could be used to perpetrate crime.*

The branch of criminalistic technology which is concerned with the study of firearms, ammunition and bullet traces and develops the techniques and means of revealing, collecting and examining these objects as material evidence is called forensic ballistics.**

Forensic ballistics has developed on the basis of expert examination of bullet injuries, firearms and ammunition. It is essentially based on general ballistics and other military and technical knowledge concerned with materiél, weapon design-

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* The USSR has a strict system of granting, purchasing, and registering weapons. Shops sell only smooth-bore firearms, and only to persons involved in game hunting. Combat (rifled) firearms are granted only to persons who need them to execute their official duties, e.g., to servicemen, militia men, guards, and so on.

** Ballistics is a military and technical discipline dealing with the study of the flight dynamics of projectiles. It is subdivided into internal ballistics, which studies the motion of projectiles in the bore, and external ballistics, which studies the flight of projectiles after discharge from the bore. The term "forensic ballistics" is largely conventional, underscoring the fact that ballistic evidence is being used in connection with some criminal offence punishable by law.

ing, etc. Forensic ballistics has also come to include the basic provisions of the study of clues relating to the mechanism of trace occurrence and identification of an object by its traces.

With respect to examining the damage done by bullets to clothes and the human body, forensic ballistics is closely connected with forensic medicine.

The following are the objects of forensic ballistic studies:

(a) hand firearms and their parts;

(b) loaded ammunition for hand guns and their components, including fired bullets, spent cartridge-cases, shot, buckshot, wads, gaskets, gunpowder and so on;

(c) traces of damages from bullets by handguns; and

(d) other ammunition (grenades, mines, and explosive devices) and their components and traces.

As in other branches of criminalistic techniques, the tasks to be solved in forensic ballistic investigations may be divided into two categories, identification and diagnostic. The former includes those aimed at establishing the group affiliation and individual identity of firearms by fired bullets, cartridge-cases and shot; establishing the group affiliation, including the common origin, of ammunition and their components and parts; and identification of the whole by its part, for example, the bullet by its cartridge-case.

Diagnostic tasks include: (a) those connected with establishing the correlation of the object with given characteristics to see whether it is a firearm; whether it is in good order and suitable for firing bullets; whether it would be possible to fire a shot from a particular firearm without pressing the trigger; and whether that object is an explosive device; and (b) those designed to clarify the workings of the event to establish whether shots were fired; the direction and distance of the shot and the location of the shooter or explosion.

Forensic ballistic studies help to establish facts to duly qualify a crime (to assign objects to firearms, ammunition, or explosive devices). By means of such investigations, one could gain more information about the event, specifically, whether firearms and ammunition had been used; determine the place, time and manner in which the crime was perpetrated; and establish the causality between actions and consequences (number and sequence of shots fired, etc.).

The solution of problems related to forensic ballistics requires a knowledge of firearms and ammunition design and properties, knowledge of firing mechanism and interaction of projectiles with various obstacles. Given this knowledge, the investigator should be able to independently solve some of those problems when inspecting the scene of a crime and relevant material evidence. Final decision would require a forensic ballistic examination. In cases where the bodies of survivors and victims' corpses show signs of injury or their clothing has been damaged, authorities concerned should conduct a comprehensive forensic ballistic and forensic medical investigation.

2. CLASSIFICATION OF FIREARMS, ITS REMOVAL, AND INSPECTION AT THE SCENE OF A CRIME

In criminalistic practice, hand guns are simply classified and subdivided into combat (military and civilian)*, hunting, training-and-sporting, and criminal arms.

Combat firearms are industrially manufactured, single-loading, repeating guns with a rifled barrel and, as a rule, sliding breech block, designed for firing bullets. Depending on the barrel length, combat firearms are classified as short-barrelled, medium-barrelled, and long-barrelled. Short-barrelled firearms have a barrel of up to 20 cm long and include semiautomatic pistols and revolvers. Medium-barrelled firearms (barrel length 20-40 cm) include submachine guns and carbines. Long-barrelled firearms (barrel length over 40 cm) are rifles (or carbines) and light automatic machine-guns (see Fig. 11).

Like in some other types of weapons, an important property of combat firearms is the presence of rifles in the barrel bore. *Rifles* are spiral grooves (usually 4-6); when the bullet cuts into them, in addition to translatory motion, it acquires rotary motion. This results in greater hitting range and better firing accuracy. Rifles inside the barrel are of paramount significance for forensic ballistics, both from the viewpoint of the projectile's range and penetrating power and for identifying a weapon by the fired bullets.

Most European firearms (with the exception of Spanish mod-

* Civilian firearms include pistols and low-power revolvers.

els) have the twist of the rifling right-handed, i.e., the grooves go up from left to right; in US-made arms the twist is left-handed.

The *calibre* (the diameter of the bore) is highly important for characterising a firearm. In rifled arms, it is measured between the opposite rifling lands. The USSR and all other European countries except Great Britain use millimetres to designate the calibre of rifled firearms; Great Britain and the United States use the decimals of an inch.* The calibre shown in millimetres more or less corresponds to the bore diameter ("true calibre"), whereas the American and British calibres are largely conventional and more often designate the bullet diameter ("nominal calibre").

In practice, we most frequently come across combat firearms of the following calibres, mm: 7.62, 7.65, 8, 9, and 11.43 (pistols, revolvers, and submachine guns) and 6.5, 7.62, 7.65, and 7.92 (rifles and carbines). The past decade in West has witnessed an increasing spread of 5.56 mm combat rifles in the United States, Belgium, Austria, France, Israel, Italy and Switzerland, and even of 4.7 and 4.85 mm rifles in West Germany and Great Britain, respectively.

Table 1 shows the correlations of the most widespread calibres.

Table 1

Calibre designation in mm	US calibre designation in hundredths of an in.	British calibre designation in housandths of an in
5.5	0.22	0.229
6.35	0.25	0.250
7.0	0.28	0.280
7.65	0.30	0.300 (0.303)
8.0	0.32	0.320
9.0	0.35	0.350
9.5	0.38	0.370
10.0	0.40 (0.38,041)	0.410
11.0	0.44	0.440
11.45 (11.43)	0.45	0.450 (0.455)

Combat repeating firearms are classified into non-automatic, semi-automatic (self-loading) and automatic (self-firing) ones.

* 1 inch = 2.54 cm.

In a non-automatic firearm, the breech block for reloading is manually operated by the shooter, as with a rifle or carbine equipped with magazines. Revolvers are also non-automatic weapons.*

In semi-automatic and automatic firearms, reloading takes place under the effect of powder gases. But to fire a semi-automatic pistol, for instance, one must pull the trigger each time. An automatic weapon continues firing as long as the trigger is pressed and the magazine still holds cartridges. This concerns submachine guns and carbines.

The properties of a combat firearm which concern its reloading mechanism have important criminalistic significance, since they determine the presence, position and type of traces that occur on fired cartridge-cases and bullets and are subsequently used to establish and identify the type (system, model, specimen) or weapon used.

Industrially manufactured *hunting rifles* are long-barrelled, classified primarily by the type of projectiles for which they are designed, and include bullet guns, shotguns and combination bulletshot guns.

A bullet hunting gun would normally have one rifled barrel for firing bullets, either full- or semi-jacketed. They distinguish three types of hunting rifles: with the calibres 5.6-9 mm, less than 16 mm and 12-28 mm guns.

Hunting shotguns have one or several (most often two) smooth barrels situated horizontally (alongside) or vertically (beneath each other). They are intended for firing shot or buckshot, and also round or specially designed lead bullets. The calibre of hunting smooth-bores is measured differently than that of rifles. It is based on the number of spherical bullets with diameter equal to the bore diameter, that can be cast from one British pound of lead (454 g), and equals 12, 16, 20, etc.

When measuring the bore diameter, one must take into account that smooth hunting gun bores may have been drilled:

(a) cylindrically, when the bore has the same diameter from the muzzle to the breech piece;

* In a revolver, a magazine is a cylinder revolving around an axis parallel to the bore axis. When the weapon is fired, the cylinder chamber (with the cartridge) rotates into alignment with the bore to play the role of a cartridge chamber.

Table 2

Correlation of Shotgun Calibres

Calibre designation	mm	in	Calibre designation	mm	in
12	18.52	0.729	24	14.71	0.579
16	16.81	0.662	28	13.97	0.550
20	15.62	0.615	32	13.36	0.526

(b) conically, when the diameter decreases toward the muzzle end by 0.1-0.25 mm (improved cylinder);

(c) to get a chokebore, i.e., a bore that narrows toward the muzzle by 0.25-1.3 mm.

Table 3

Reduction of Bore with Different Degrees of Choke*

Calibre	Improved cylinder	Reduction of bore in mm			
		Quarter choke	Half choke	Three-quarter choke	Full choke
12-bore	0.10	0.10-0.35	0.35-0.75	0.75-1.00	More than 1.00
16-bore	0.07	0.07-0.25	0.25-0.55	0.55-0.85	More than 0.85
20-bore	0.05	0.05-0.20	0.20-0.45	0.45-0.75	More than 0.75

Combination hunting rifles are designed for shooting both with shot and bullets, and for this purpose they have grooved barrels.

Hunting rifles may be "breech-block"-type (carbines) and "break"-type (like most shotguns). To reload the latter, the hinged barrels are lowered and subsequently locked into place by means of a lever handle. We distinguish hammered hunting rifles with outside hammers and "hammerless" models with ham-

* *Source:* A. Svensson and O. Wendel, *Crime Detection. Modern Methods of Criminal Investigation,* Amsterdam, New York, 1955.

mers built in the firing mechanism being concealed in the gun stock.

Training and-sporting firearms. These include training weapons, chiefly so-called small-calibre guns (5 and 6 mm) for firing rim-fire cartridges, e.g., pistols, revolvers, and rifles, and also sporting guns. The latter are divided into target small-calibre guns, e.g., pistols and rifles; target guns of any calibre using combat firearm cartridges, e.g., pistols and rifles; and double-barrelled smooth-bores designed for target shooting.

Criminal firearms (including non-typical models) are generally short-barrelled and divided into:

(a) home-made, i.e., made fully by oneself or including only some factory-made elements. Criminal firearms may be muzzle-loading pistols or breech-loading guns made like pistols or revolvers. Home-made guns may be single-loaders, with magazines and even automatic. The barrels of home-made guns are usually smooth-bored. Not infrequently, these firearms are concealed in fountain pens, sticks, umbrellas, etc.;

(b) sawn-off guns made by shortening the barrels (and stocks) of military weapons, hunting or training guns, e.g., rifles and/or carbines;

(c) special devices remade to fire projectiles, e.g., signal, starting, and piercing pistols and/or tear-gas revolvers;

(d) factory-furnished firearms remade for some other cartridge.

One can obtain substantial information for determining the characteristics of firearms from trademarks on the grip plates, and also from inscriptions and markings stamped on metal parts of factory-made combat hunting and sporting weapons. Such markings might be government gun marks; company trademarks; factory emblems; inscriptions indicating the country, town and year of manufacture and calibre designation.

Hunting rifles bear company and factory trademarks, and individually made models—the gunsmith's name. They also have test and control marks and specific characteristics to show the type of barrel drilling, calibre and length of cartridge chamber.

When a firearm is found at the scene of a crime it must not be touched until its position has been photographed, indicated in a report and marked in a plan (map), taking into account its

classification. The investigator should also specify the weapon's type and system and its position in relation to the corpse, indicating the direction of the barrel, the side on which the gun lies and the distance from the gun to both palms of the victim.

The weapon should be removed with precautions, keeping in mind that it may be loaded. The responsible official should remove it so as not to leave fingerprints. He does this by taking hold of the chequered grip plates of the pistol or the sides of the trigger guard. When inspecting the weapon, the investigator should take note whether or not there are fingerprints, blood particles, dirt, etc., on the surface. He should then note in detail all the gun's specific features, e.g., presence of markings, defects, etc. Special attention should be given to the weapon's condition, including that of its firing mechanism; it should be noted whether there are cartridges in the cartridge chamber and magazine (cylinder), gunpowder residue and unburnt powder grains in the barrel and whether there is a burnt powder smell in the bore. After the weapon is inspected and unloaded, it should be packed and sent for expert examination.

3. WHAT STORY CAN A FIREARM REVEAL

A forensic ballistic examination of a firearm makes it possible, first of all, to establish whether the object belongs to the category of firearms. This is important in as much as some objects that really are firearms do not resemble them outwardly, e.g., firing cylinders, fountain pens, etc. Quite often, the investigator encounters objects which have all the outward features of firearms, but in reality are not, e.g., toys, mouldings, etc.

It is important to establish the type, system, model, and/or specimen of a given weapon and also its ballistic characteristics. In this case, the factors to be specified are, for instance, the weapon's maximum firing range and whether directed fire over a definite range is possible. By examining the weapon, one could also establish if it had been fired after being cleaned.

Forensic ballistic examination is often conducted to determine whether the weapon is in good order and suitable for firing. It is important to establish both these facts for a weapon

could be out of order, but nonetheless good for firing; hence, to have the expert scientist determine simply whether it is in good order would be incorrect. In determining whether a firearm is serviceable, the expert must seek to clarify whether it could be fired repeatedly or just with single shots.

If an expert examination has established that a weapon is unserviceable and why, one must decide how readily the fault could be remedied. Quite often, criminals remove some part of the firing mechanism (usually the firing pin) and store it separately so that, if and when the weapon is found and taken from them, they could claim it was unserviceable in principle.

To establish the causes of defects in firearms is also important in those criminal cases where the investigator must decide whether spontaneous shots are possible, i.e., shots without pulling the trigger. However, one should not confuse spontaneous shots with accidental shots, when the trigger is pressed by some alien object like a tree branch or wall nail, or when the shooter presses the trigger thinking the rifle is not loaded.

In studying the circumstances of a spontaneous shot, forensic ballistic investigation must establish whether a given weapon may have been fired without pressing the trigger, for instance, due to a design or manufacturing fault, or defects that occurred during service, e.g., wear of parts, etc.

Normally, certain details of the case in question are needed if one is to establish whether a spontaneous shot may have occurred in principle. Questions must be answered that could help determine such a possibility in the given circumstances, for instance, if the firearm was dropped, hit or shaken.

If the firearm has significant damages (barrel crack, butt break-off, etc.), the investigator must clarify the causes. For example, he should try to find out whether the faults had been caused by manufacturing defects, use of wrong ammunition, wear of individual parts, premeditated creation of conditions conducive to barrel cracking, etc. If the damaged weapon is homemade, these faults could lie in design shortcomings.

In examining firearms, the investigator sometimes has to clarify whether the markings, chiefly the number, are genuine; whether the number was repunched; and whether the weapon has no filed, stamped-out or ground number, and, if so, what was the original reading.

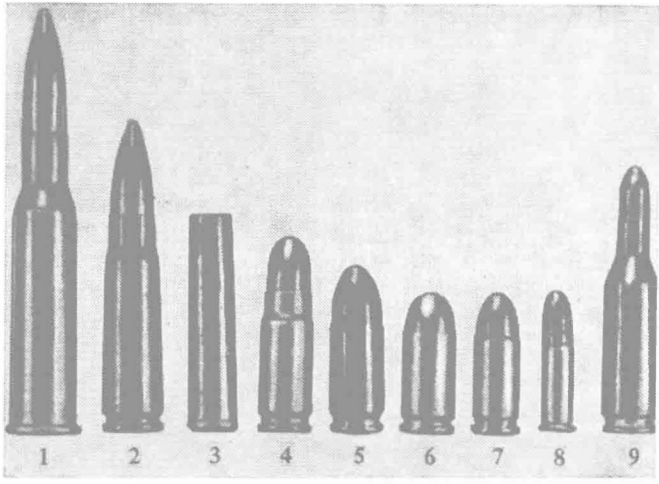

Fig. 12. Cartridges for various systems of rifled weapons: 1, 2—pointed full-jacketed bullets; 3—blunt-nosed jacketed bullet; 4, 5, 6, 7—ogival jacketed bullets; 8—ogival naked bullet; 9—ogival semi-jacketed bullet.

4. CRIMINALISTIC EXAMINATION OF AMMUNITION FOR FIREARMS

Criminalistic study of firearm ammunition involves both the examination of loaded cartridges and their individual components, including fired projectiles and spent cartridge cases. The subjects of investigation are trace-reflections that occur on fired cartridges, cartridge cases, bullets and other components, and also the substances contained in ammunition.

Depending on the type of firearm, one must distinguish live cartridges, sporting cartridges and hunting cartridges. Live cartridges include rifle, pistol, revolver and intermediate (between pistol and rifle) cartridges.

A modern unit cartridge for combat firearms comprises a cartridge case, percussion cap with priming composition, a weighed portion of powder and a projectile (bullet). Cartridge cases are made of metal (brass or iron) and are either cylindrical, bottle-shaped or conical (see Fig.12). Civilian firearms can use only cylindrical cartridge cases, while combat arms use all the above-mentioned three types. A bottle-shaped case makes it possible

to load large amounts of powder even when the cartridge (bullet) calibre is relatively small. The cartridge case contains a neck, chamber and base. The bullet is secured in the neck; hence, its bore corresponds to the external diameter of the bullet and, approximately, to the firearm calibre (the bullet diameter exceeds the barrel calibre by about 0.02-0.05 mm.). The bullet is secured in the cartridge case either by centre-punching, crimping or tight seating. Either one of these methods could be distinguished by traces remaining on the cartridge case and bullet.

A weighed portion of powder is placed in the case chamber. Modern combat firearms use smokeless powder, usually pyropowder. The powder consists of grains characterised by specific shape, size and colour. Normally, fine-grained powder is used in pistol and revolver cartridges, and coarse-grained powder in rifle cartridges.

A percussion cap with priming (ignition) composition is secured in the percussion cap holder of the cartridge case base. The priming compositions are either mercury fulminate or lead trinitroresorcinate. The products of powder and priming composition combustion are objects of investigation when examining ammunition and bullet damages. As the percussion cap is located in the base centre, the weapon is termed a central fire gun.

Depending on the base design, we distinguish rimmed cartridge cases, whose base diameter is greater than that of the chamber, and rimless cases which have an extractor groove which runs round the circumference of the base. The rim and the extractor groove serve to grip the cartridge case with an extractor claw when withdrawing the case from the cartridge chamber. On the base of the cartridge case there are generally both calibre and manufacturer's marks, the year of manufacture and conventional symbols (markings).

Bullets for combat firearms could be full-jacketed or semi-jacketed. In practice, we also come across jacketless or naked (lead) bullets intended for old-design revolvers. A normal bullet consists of a steel core, a lead jacket, and steel jacket covering both of them. To ensure that the steel jacket does not damage the barrel bore, it is plated (coated) with tombac or brass (soft metal alloys). In semi-jacketed bullets, the bullet nose is not covered with a jacket. In the bullet, we distinguish the nose,

body and tail. Depending on the nose shape bullets may be ogival (rounded), round-nosed, pointed (conical), and blunt-nosed (like a truncated cone) (see Fig. 12). The bullet body is cylinder-shaped. When the bullet passes through the barrel bore, traces from lands remain on it. The bullet tail may be cone-shaped (like 7.62 mm rifle bullets, for instance), and the bullet base may have markings.

Cartridges for sporting guns most frequently have a 5.6 mm (0.22) bore and consist of a cylindrical case loaded with naked lead bullet. The base of the cartridge case has a rim, and the percussion cap is absent. The priming composition is pressed round the entire inside surface of the case base. The firing pin of a sporting small-calibre gun strikes the peripheral part of the rimmed base to induce ignition of the priming composition and powder. Such cartridges are called rim-fire cartridges.

The cylindrical part of a bullet for sporting cartridge has several circular grooves along the surface for holding a lubricant, designed to protect the barrel bore from leading. Conventional symbols accepted for such cartridges in the country where they were made are inscribed on the case base.

Cartridges for hunting guns are central-fire cartridges, and those intended for rifled barrels are almost the same as live cartridges. However, the bullets may be either naked or semi-jacketed. Occasionally, a felt wad is placed in such cartridges between the powder charge and bullet.

Cartridges for smooth-bore (shot) guns have cylindrical all-metal or cardboard case in which the lower part of the chamber and the base are made of metal. The case base incorporates percussion cap. The case is filled with powder with a gasket and wad placed on top ("an over-powder wad"). Then shot is filled or a bullet loaded, a gasket or wad placed on top of the shot ("an over-shot wad") and poured with paraffin or wax. In a cardboard case, the edges are bent inwards (see Fig.13). One should bear in mind that hunters may repeatedly use the same case, especially a metal one, by knocking out the old percussion cap after firing a shot and replacing all the components.

The components of a hunting cartridge may be both factory- and home-made. Factory shot has a regular spherical shape and shiny surface. The size of factory-made shot is determined by standards. Depending on the shot diameter, it bears convention-

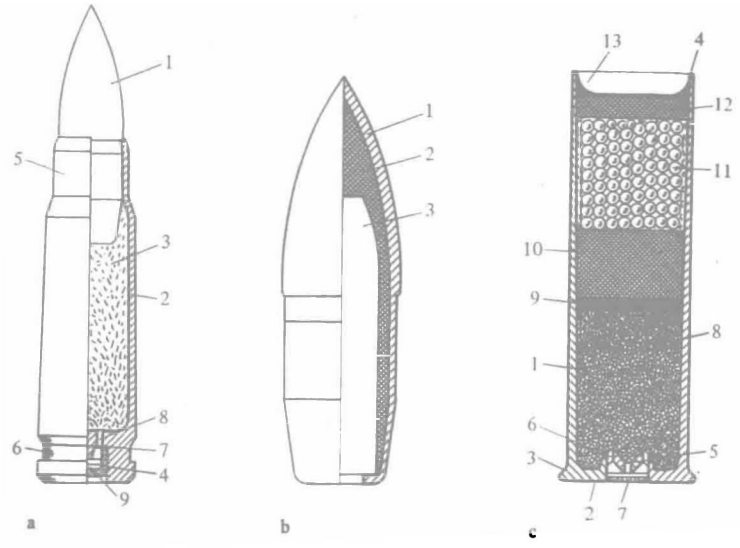

Fig. 13. a) Design of a cartridge to rifled weapon:

1—bullet; 2—cartridge case; 3—gunpowder; 4—percussion cap; 5—cartridge case neck; 6—extractor groove; 7—anvil; 8—priming hole; 9—priming composition.

b) General design of a bullet to rifled weapon:
1—steel jacket; 2—lead jacket; 3—core.

c) Design of a hunting cartridge:
1—cartridge case; 2—cartridge case base; 3—rim; 4—neck; 5—anvil; 6—priming hole; 7—percussion cap; 8—gunpowder; 9—gasket; 10—an over-powder wad; 11—shot; 12—an over-shot wad; 13—reinforcement of a wad.

al numbers. Every next shot size differs from the preceding one by 0.25 mm. The diameter of shot No. 1 equals 4 mm. Shot with diameters of 3.75, 3.5 mm and smaller size would be marked with Nos. 2, 3, etc. The smallest size (No. 10) is equal to 1.75 mm. Shot with diameters of 4.25 mm. 4.5 mm and larger sizes should be marked as No. 0 (one zero), No. 2/0 (two zeros), etc. Shot larger than 5 mm is called buck shot.

Home-made shot is prepared by casting or cutting. Cast or cut (chopped) shot may be rolled between two solid surfaces (rolled shot). The size and shape of home-made shot are optional. It may be either spherical, drop-like, pear-shaped, with porous surface, and/or with marks of tool processing on the sur-

face. Chopped nails, wire, single balls, large-grained common salt, etc., are also occasionally used as shot.

Bullets for cartridges of smooth-bore guns may also be either factory- or home-made. Factory-made bullets are classified into spherical and cylindrical. In the latter a light felt or wood stabilizer is attached to a heavy nose section. Home-made bullets are most frequently spherical.

Factory wads are made of felt, pressed paper, pressed saw dust, polythene, etc. In domestic conditions, wads may be made either of pieces of felt, rags, newspapers or books.

Not infrequently, the criminals, having no possibility to use cartridges specially designed for a given calibre, use those not intended for the weapon they have. For instance, some pistols may be used to fire undersized cartridges, e.g., a 9 mm Borhard-Luger P-08 pistol to fire 7.62 mm cartridges. Sometimes firearms can be remade for substitute cartridges by rearming the revolver cylinder chamber, inserting a bush into the pistol barrel, etc. In other instances, the cartridges may be adapted by sinking the bullet deeper in the case, crimping the cartridge case, and so on.

Home-made cartridges include those comprising parts of a standard cartridge, e.g., the bullet and/or case, or those designed individually.

Loaded ammunition is seldom found at the site of a crime. The cartridge could remain there when lost by the criminal, when ejected with marks of misfire, or stay in an abandoned weapon. Considerably more often, loaded ammunition figures as material evidence when taken from the accused or suspect.

When ammunition is found at the site of a crime, the investigator should indicate it in a report, mark its location on the plan (map) and take pictures; afterwards, he takes and examines the cartridge. First he must ascertain if it bears paints and then establish in detail all the external marks of the cartridge, bullet and case, namely their shape, metal colour, size, manner in which the bullet was secured in the case and markings.

The investigation inspection and subsequent comparison of ammunition with reference materials from albums, handbooks and textbooks is carried out to determine the type, calibre and system of the weapon for which the revealed ammunition is designed. In this case, one must understand that it is sometimes quite difficult to establish the weapon system by the ammunition, since the

same cartridges could be designed for weapons belonging to different systems, e.g., pistols and submachine guns, submachine guns and carbines.

Subsequent expert examination of ammunition helps to clarify whether the revealed object is really firearm ammunition; whether this ammunition is factory- or home-made; whether it could be used for delivering fire; and the type (system or model) of weapon for which it is intended. If a cartridge found at the site of a crime and the cartridges taken from the accused or suspect are available, the expert could be asked to establish whether they are of common origin, i.e., whether they belong to the same batch or group.

Much more often, in investigating crimes involving the use of firearms, the investigator will have to deal with ammunition parts, such as bullets, cartridge cases, shot, wads, etc.

Fired bullets are quite hard to find at the site of a crime. When searching for them, the investigator should take into account the type of weapon used (if it was found or is already known), the testimony of witnesses on the number of shots fired and the intervals between them, the information obtained from inspecting the victim's corpse, and the location of the cartridge case. Bullets may be found embedded in some obstacle, simply lying around (spent bullets), and ricochetted.

If a bullet penetrates an obstacle, the investigator must first mark in a report and plan (map) the location of the bullet hole, record its outer marks, namely hole site, shape, size, (diameter, depth) and direction of passage, and only then extract the bullet. The bullet should be chiselled out of wooden obstacles and drifted out of brickwork. Bullets must be extracted in such a manner as to ensure that the tool does not touch the bullet itself and leave marks thereon. If the bullet is lying free on the surface, one should note the trace-substances it may bear, e.g., minute glass particles in the nose part and any paint or plaster marks. The presence of such deposits might help to determine the obstacles through which the bullet passed or the surface from which it ricochetted.

In examining a bullet, the investigator notes its superficial marks, namely type (to see whether it is full-jacketed, semi-jacketed or naked); colour of the bullet and jacket metal; shape of the nose section (to see whether it is pointed, blunt-nosed,

ogival or spherical); size (length and diameter); and presence of rifling groove traces on the surface. Bullet common marks make it possible to establish what type and systems of weapons the cartridge to which the bullet belonged was intended for. An expert examination of those marks particularly of groove marks, helps to narrow the number of chances and establish the system of the gun the bullet was fired from. In this case, the investigator should take into account the direction of the groove twist in traces (left-hand twist, right-hand twist), the number of grooves, their width and angle of twist that is the angle the lands assume in relation to the longitudinal axis of the bullet.

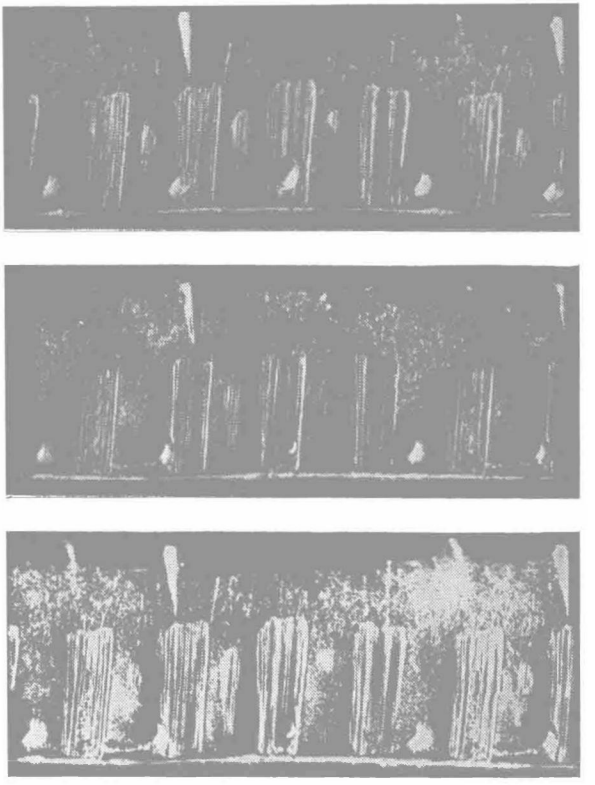

Fig. 14. Rifling land traces on a bullet jacket. *Above:* traces on the crime bullet; *centre*—traces on the control bullet; *below*—matching of traces.

A bullet sent for expert examination must be packed in a separate box or test tube so as not to damage the traces it bears. If there are several bullets, each should be numbered, indicating in the plan where the respective bullet was found.

Bullets found at the site of a crime are checked against criminal records to establish whether or not they were fired from weapons used in committing earlier crimes.

The barrel of every gun, even that of a newly-manufactured one, bears an individual microrelief. With longer use of the gun, the specificity of the relief increases. The bullet, in passing along the barrel bore, comes into close contact with the lands (raised spaces between the grooves). Since the bullet jacket material is softer than that of the barrel bore, the bullet's side surface forms traces, both from the groove edges and the lands. These traces have the form of lines of various widths (grooves and ridges) (see Fig.14). One may distinguish primary traces that go along the bullet's longitudinal axis, and secondary traces, that pass at an angle to the longitudinal axis (pitch of rifling). Primary traces occur with the bullet's translatory motion, and secondary traces, when the bullet rotates along the grooves. In examining a weapon to be identified, the expert fires several bullets into a bullet catchment box packed tightly with cotton wool or filled with water or petrolatum to ensure that the traces forming thereon remain intact. The bullets are first compared with each other to reveal stable, reproducible marks (lines) in each land trace. Then the crime bullet (e.g., extracted from a victim's corpse) is compared with a control bullet. The most suitable and widespread method involves comparison microscopy of details of corresponding traces. A comparison microscope makes it possible to observe both objects in one field divided into two and to displace them vertically and horizontally in order to search for coinciding marks, and photograph them. To compare traces on bullets, other techniques could also be used, e.g., photographic representation of the complete bullet surface on the plane and obtaining trace profile outlines.

Certain superficial marks of fired bullets could help establish factors that might prove useful in finding the weapon used. For instance, if the bullet distinctly shows not only the land but also the groove surface traces, this would indicate that the barrel of the gun used was considerably worn, i.e., the weapon was old.

Random traces on the bullet would indicate that the bullet was fired from a larger-calibre gun. Again, if the bullet was shot from a smaller-calibre weapon, the bullet jacket would be elongated and the core tightly crimped. This might occasionally lead to complete rupture of the bullet steel and lead jackets. The damage could be done by bullet fragments, including its steel core. A number of deep striations along the longitudinal axis of the bullet would indicate that it was fired from a sawn-off gun, the scratches having been left by barbs in the muzzle end.

Fired cartridge cases are ejected when reloading military weapons of all systems except revolvers, and metal detectors are used to search for them. Sites that could conceal cartridge cases, e.g., puddles, garbage heaps or open reservoirs should be carefully searched. In living quarters a cartridge case could get stuck in the folds of hanging clothes or behind a picture on the wall. In one instance, a cartridge case was even found in a coffee cup.

The absence of cartridge case at the site of a crime could indicate (a) that the semi-automatic or automatic gun used was not working properly; (b) that a revolver or hunting rifle was used; (c) that a muzzle-loading gun, including a home-made model, was used; or(d) that the criminals were knowledgeable and carried it away.

Having found the cartridge case, the investigator registers its location in a report and plan (map), photographs and then collects it. First of all, he must look for paints on the case, and then note its superficial marks, namely, chamber shape, base design, colour of chamber and percussion cap metal, base markings, size (length, chamber external diameter, and neck bore), and marks of bullet fastening in the case. He also notes the presence of a powder residue on the outer case surface, unburnt powder grains and their marks inside the case and burnt powder smell from the case chamber.

All these things help to determine the type and system of the gun which the cartridge, of which the revealed case was a component part, was intended for. The removed case is then packed in the same way as a bullet, i.e., separately from other objects. If several cases are found, each should be numbered and indicated in a report and plan (map), specifying the place where it was located. Removed cases are then sent off for expert examination.

A group of traces whose common marks make it possible to establish the gun system and whose specific marks (microrelief details) may be used to identify a concrete gun specimen, could remain on the surface of a fired cartridge case. In making a home-made gun, a large number of trace-forming parts are treated by hand. Hence, the minutes marks of their microrelief would be of a chance nature, and in their totality could individualise a given object (gun part). Most characteristic in this respect could be traces from the firing pin and cartridge stop.

A fired cartridge case is used to make an identification when the investigator is in possession of the suspect weapon or when several cartridge cases have been revealed in connection with several crimes. In the former instance, 3-5 cartridges intended for the given gun calibre are fired experimentally. Among the control cases, the investigator selects the one with the most pronounced and persistent traces to compare it with the case found at the site of the crime. The two are compared either with a comparison microscope or using photographs enlarged to the same scale.

A body of a young woman shot with a pistol was found near a military base in one of the West European countries. Not far from the body, a pistol cartridge case was found by means of a metal detector.

A subsequent forensic medical investigation revealed that the woman was pregnant, and the investigators assumed the murderer was a man from the military base who was reluctant to let his relationship with the woman become known.

The entire personnel (50 men) had to surrender their pistols for one day allegedly for technical inspection. Two shots were fired from all fifty pistols, and the resultant control cartridge cases sent off for expert examination.

Forensic ballistic experts had no special difficulty in establishing that the marks on the case found at the site of the murder and those on the cases fired from the pistol belonging to serviceman X. coincided. However, to avoid a possible mistake and so as not to mix up the cases, the expert suggested that the weapon itself, i.e., X.'s pistol, be sent to him. However, when X. was asked to surrender his pistol, he shot himself.

If a smooth-bore hunting gun has been used to commit a crime, the investigator will have to deal with shot or buckshot traces.

In looking for shot traces, he should take into consideration the approximate firing range and possible hit or scattering area of the shot. The discovered hitting site is registered in a report and plan (map). In this case, the investigator measures the circle diameter (or, at oval scattering, the larger and smaller ellipse axes) and the average distance between neighbouring pellets. He also counts the total number of traces of shot (which penetrated or left dents) and then photographs the traces. The penetrated shot is extracted in the same way as bullets and the extracted shot examined to record its superficial marks, namely, shape, size, surface colour and condition, presence of surface contaminations and pellet deformation. The shot size is determined to establish its number; at the same time, the shape and condition of its surface makes it possible to clarify whether it was factory- or home-made.

In addition to shot (buckshot) fired from hunting smooth-bore guns, the investigator might also reveal such cartridge parts as wads and gaskets. The location of wads and gaskets could indirectly help determine the distance of the shot; hence, it should be indicated accurately in a report and plan (map).

Inspection by the investigator and subsequent examination by experts of wads and gaskets helps to determine whether they were factory- or home-made, and also the bore of the weapon for the cartridges to which they were intended.

Quite often, in studying different pieces of ammunition for hunting guns, the investigator will have to establish their common origin. This is a way of establishing a group affiliation and determining whether the cartridge found at the site of the crime and the cartridges taken from the accused or suspect were manufactured by the same company; whether or not the shot removed from the corpse and that from the cartridges taken from the suspect belonged to the same group; and whether the wads from the site of the crime and those removed from the cartridges were of the same make.

Such forensic ballistic investigations are conducted by experts in different specialities, e.g., criminalists, biologists, chemists, physicists and others. This is due to the different nature of the objects studied, and also by the diversity of the investigation methods used. A comprehensive investigation involves a study of

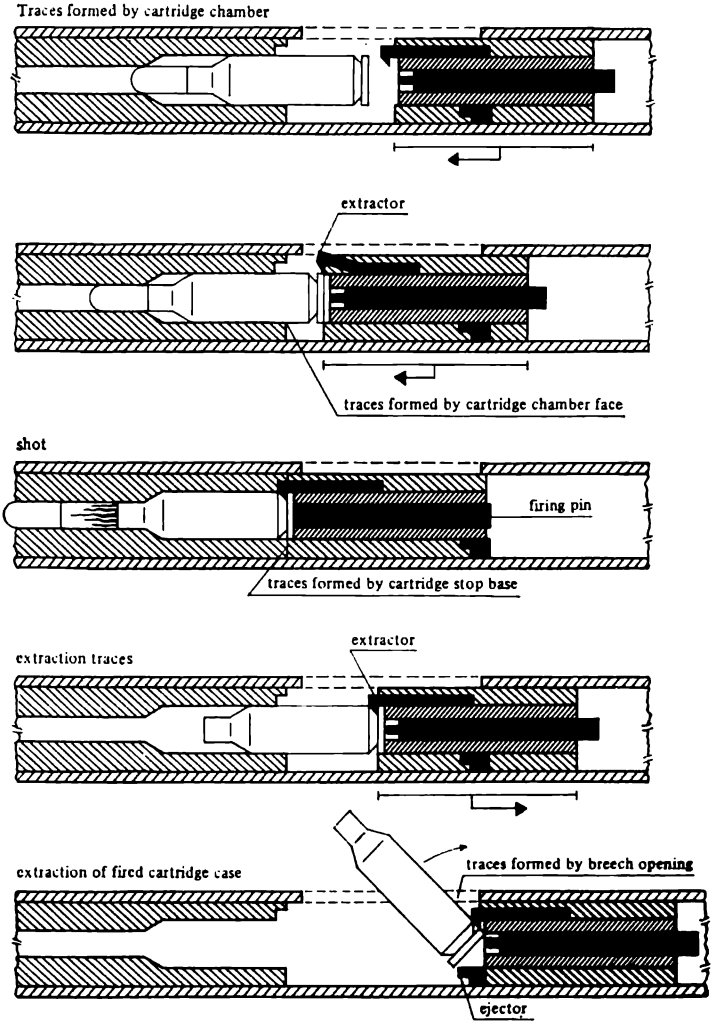

Fig. 15. Mechanism of trace formation on a cartridge case.

the morphological, physical, chemical and other properties of shot, wads, gaskets and gunpowder, using microscopy, X-ray radiography, electrography and spectral analysis.

Based on these studies, the investigator determines the similarity of the raw materials used, manufacturing technique, load-

ing and storage conditions. If the experts conclude that the pieces of ammunition were identical in origin, this would be of great importance as evidence in the case.

In some cases, the examination of parts of hunting cartridges makes it possible to identify objects. For instance, the cutter used for making a wad could be identified by the traces on the side surface of a home-made felt wad, and the device used for sinking the percussion cap in the percussion cap holder by the traces on the cartridge case base. If a scrap of paper from a book, newspaper or notebook has been used as a wad, this opens additional opportunities for identifying the latter (identification of the whole by its part). The wad should be compared with remains of books, newspapers, etc., taken from the suspect. In this case, the shape of paper scraps, type of paper, presence of lines and presence and contents of a printed or handwritten text could serve as identification marks.

Identification of a smooth-bore hunting weapon by fired cartridge cases is significantly complicated by the fact that the same cartridge case (especially an all-metal one) may be used repeatedly. Hence, the traces on the cartridge case base that occur from the frame panel, locking the cartridge case in the cartridge chamber could be used for identification if they appeared on a newly-used case and are not covered by other marks. A trace from the firing pin on the cartridge case percussion cap may be used for identification every time a cartridge case has been found (see Fig. 15).

5. EVIDENCE THAT MAY BE OBTAINED IN CRIMINALISTIC INVESTIGATION OF BULLET TRACES

The external marks of bullet traces depend on the type of weapon and ammunition used; on the material of the obstacle at which the bullet was fired; and on the firing range. In determining the latter, one may distinguish: (a) a point-blank shot (a contact shot, a near-contact shot); (b) a close-range shot; and (c) a distant shot. The external marks of a shot are reflections of main and additional traces which occur on an obstacle when the latter is hit.

Main traces appear on the obstacle when it is directly hit by

the projectile. The results are holes (through or blind ones), dents (in solid, most often metal, objects), and traces of clipping off and/or splinting off (in timber and/or brittle obstacles) resulting from ricochets.

Additional traces occur under factors concomitant with a close-range shot and include the dynamic and thermal effects of gases forming in the barrel bore as the weapon is shot to result in the tearing and scorching of fabric deposition of soot and incompletely burnt powder grains; and sedimentation of bore lubrication products.

Based on a criminalistic study of the marks of bullet damage, the investigator establishes the use of firearms and the type of weapon and ammunition employed, and determines the points of entry and exit opening and the direction and range of firing. To determine the point of entry (direction of projectile flight), the investigator uses the following marks. In hitting an obstacle, fragments of an object are knocked out by the bullet and driven into the bullet track (inside the hole). Hence, the first mark of an entry hole would be the absence or flaw of a small surface site. In dry wood, plywood, cardboard and iron sheet, the size of the flaw approximately corresponds to the projectile diameter. In brittle materials such as glass or brick, it is greater than the projectile diameter. When a bullet hits plastic material such as rubber, fresh tree bark, etc., the flaw may be difficult or impossible to discern. Damage by bullets to glass, plastics and similar materials is characterised by funnel-shaped expansion toward the bullet's exit opening. If the glass has broken into separate pieces along cracks, the investigator should take note of the surfaces of the edges of glass fragments. When glass is perforated by a bullet, radial and concentric cracks develop, the former radiating from the hole and the latter representing sections of concentric circles around the hole. In accordance with the crack, the edges of fragments are found to have fan-shaped wavy lines. In the radial cracks the expanding part of the fan turns toward the bullet flight direction, while in the concentric cracks it looks in the opposite direction.

A second mark of an entry hole is the "contact ring" which represents a dark-grey or black ring along the hole periphery. The "contact ring" occurs due to bullet contact with the hole edges and resultant deposition thereon of the bullet's metal mic-

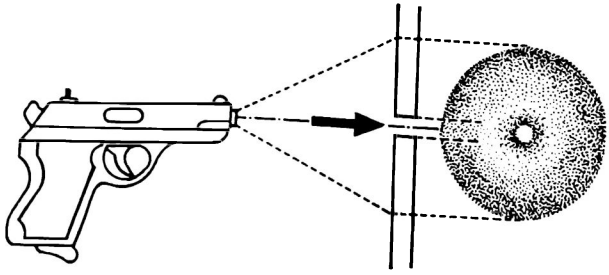

Fig. 16. Scheme of trace formation of a close-range shot.

roparticles and discharge and powder residue products which the bullet surface has acquired when passing through the barrel bore.

If the shot is fired point-blank, the area around the entry opening will bear a mark of the muzzle end. Additional traces of scorching, soot or powder grains are also marks of an entry hole (see Figs. 16 and 17).

All this helps to determine the distance from where the shot was fired. For different weapon systems, the range of effects of close-shot factors varies. For instance, for long-barrelled service weapons, e.g., rifles and carbines, scorching is observed when the shot is fired from 5-8 cm; tearing of clothes fabric up to 10-12 cm; soot deposition up to 40-50 cm, and powder grain deposits up to 80-100 cm (occasionally up to 150 cm).

For short-barrelled guns, these parameters are correspondingly less due to the lesser amount of powder in the car-

Fig. 17. Marks of a close-range shot on a body.

tridge and to lower pressure in the barrel bore. When firing a 7.65 mm pistol, scorching may be either totally unobserved or occur at a range of 3-5 cm; fabric tears up to 5-7 cm; soot deposition appears up to 25-40 cm; and powder grain deposition up to 50-70cm.

When firing smokeless powder from hunting rifles, the range at which scorching is observed equals approximately 25 cm, while soot depostion occurs at 80-100 cm.

External (morphological) marks alone help to approximate the firing range. It could be determined more accurately by expert examination. In this case, it would be desirable to provide the expert with the weapon and ammunition used, since this would allow him to obtain more comparable samples. The investigator would involve microscopy, spectral analysis, electrography, and infrared and ultraviolet examination. The set of methods used would help in the study of metal deposits in the zone of additional traces. The obtained data would be compared with the results of similar investigations of comparative samples to improve the accuracy and authenticity of the expert's conclusions.

Since these techniques are highly sensitive, objects with traces of close-range shots must be handled carefully upon their removal and examination by the investigator. If damage done by firearms has been revealed on clothes, the corresponding sites should be sewn around from both sides with a clean white fabric or placed between white paper sheets. Then the piece may be carefully rolled up so that the damage is turned inside.

Correct determination of the firing range is significantly important in criminalistic investigations. It not only clarifies the mechanism of a given event but often rules out the possibility of an accident or suicide and confirms the murder version.

A watchman's body was discovered in the guard room of a civil construction site. The man was seated at a table, body tilted forward and head lying between his hands on the table. Near the heart there was a bullet wound. The watchman's rifle was also lying on the table with the muzzle end facing the body. The guard room door was locked from inside. The corpse was found by workers who had come to the premises early in the morning and had by chance looked into the room window.

All the evidence pointed toward suicide. However, an expert examination established that the shot was fired from a range of

over 80-100 cm, i.e., from a distance that excluded the possibility of inflicting injury with one's own hand without additional implements, e.g., without securing the weapon in a vice and tying to the trigger a cord slung over a block-like beam. So, the verdict was murder. But what about the door locked from inside? A careful inspection showed that when it was closed there was a gap between the door and the jamb, one wide enough to give free access to an object like a metal ruler, which could be used to hold the hook when opening and closing the door.

The fact that at the time of the murder the watchman was quietly sitting at the table showed that the murderer was someone whom the victim knew pretty well and did not fear. In the end, this inference was instrumental in tracking down the criminal.

When injury is inflicted with a hunting rifle, the shot traces may be used to determine a distant firing range as well. When fired from a range up to 3 m, the shot charge would fly as a compact mass to make a single hole. When fired from more than three metres, one observes a scattering effect, i.e., the separate penetration of each pellet. The greater the firing range, the greater the scattering area. Knowing the rifle bore and the way the cartridge was loaded, one may, guided by reference data, determine the approximate distance of the shot. More specific evidence could be obtained by an expert examiner who would experimentally fire the same gun and same ammunition as those used in the crime.

In addition to elucidating factors concerning the direction and distance of the shot, the investigator quite often must establish the approximate location of the shooter. This may be done by different methods, depending on the type of traces and the objects found at the site of the crime. Sometimes, footprints serve the purpose; for instance if there are traces of a close-range shot, the investigator could, with consideration for the range, determine the position. In this case, the shot range is taken as the distance from the muzzle end to the obstacle. If wads have been found, this could also be indicative, considering their flight range (2-3m).

The firing position could be determined by the cartridge case ejected from the weapon. To that end, the investigator must know the gun system used and refer to materials indicating in

what direction (right, left or forward), at what angle to the gun axis and to what distance the cartridge cases were ejected. However, one must also bear in mind that the cartridge case might ricochet or roll away after dropping. If the shot has been fired from a long range, one may determine the shooter's position by establishing the bullet path. This is possible when damages or injuries result from two bullets, i.e., if there are two holes or a hole and a ricocheting mark. If the bullet has pierced two surfaces, e.g., a double window frame, the investigator inserts a paper tube through which he can sight the bullet path. The site visible through the tube may be then photographed. In this case, the lens axis must coincide with the sighting line.

If there is a through hole in one object and a blind hole in another, the investigator determines the bullet trajectory using a stretched thread connecting the centre-points of the holes. The thread extended beyond the site would indicate the areas in which the weapon may have been when fired.

If there is one through or blind bullet track, the investigator may still be able to determine the direction of the shot provided the bullet track length exceeds the projectile calibre several times, i.e., if the track is sufficiently deep. In this case, the investigator inserts a wooden stick with a slightly smaller diameter than that of the hole. The stick axial line indicates the bullet path in space.

Using any of the above-mentioned methods, the investigator should take into consideration the deviation of the bullet trajectory from the sighting line. Only when shooting from close range, does the bullet fly along a virtually straight line. With considerable firing ranges, they distinguish the ascending and descending branches of the bullet path. Hence, having established by sighting the position of the shooter, the investigator must bear in mind the possibility of a certain adjustment, taking into account the range of a projectile fired from a weapon of a given system.

The investigator should also examine the discharge products on the shooter's hands, e.g., when seeking to confirm a suicide version or to establish that a shot was fired by a given person.

When shots are fired, the gases that carry the discharge products emanate not only via the barrel but also through other interacting gun elements, e.g., the breech block, receiver, slide, pis-

tol frame, etc. As a result, a hand holding the pistol will bear certain components of the priming composition and powder combustion products. On firing a long-barrelled gun, discharge products will also remain on the shooter's cheek.

The investigator may use different methods to reveal discharge products on the shooter's hands and face. Samples from hands can be obtained by means of a paraffin gauntlet. The checked person's hands or face can also be washed with distilled water. The samples can be examined by several methods differing in sensitivity and specificity of results, e.g., by means of optical and electron microscopes and other instruments.

6. SPECIAL AMMUNITION AND TRACES OF ITS USE COULD ALSO BE OBJECTS OF CRIMINALISTIC STUDY

Special ammunition includes technical devices such as mines, shells, etc., that comprise a charge of initiating medium, an effective part, a fuse and a body (either metal, wooden or plastic). Some classes of mines could have no body. Home-made special ammunition is often concealed as readily transportable objects which can be left as "forgotten" things.

Depending on the effective part and fuse designs, special ammunition may be contact and contactless. We commonly distinguish impart fuses (actuated by impact or pressure); mechanical or electric time fuses; vibration, acoustic and radar proximity fuses; and those actuated by coded signals.

The explosives used in special ammunition are chemical compounds or mixtures capable of undergoing rapid chemical reactions accompanied by the release of large amounts of heat and gas generation.

An investigator inspecting the site of an explosion must reveal, indicate in a report and remove the objects possibly related to the explosion. In this case, certain difficulties could arise because he would still not know the type of special ammunition used and, consequently, the relevant components he should search for. Hence, the advice of an expert in special ammunition and explosives is needed.

Taking into consideration the design of special ammunition, the investigator could reveal traces of explosive, ammunition

and shell (or its substitute) compounds and remains of power sources, wires, clockwork devices, or some other mechanism used to cause a blast. Remaining fuse elements could be wires and other parts of detonator circuit, actuating mechanisms (needle pellets, electric contacts, pistons, etc.), blasting caps and safety devices, e.g., springs, membranes, caps, retaining balls, arming pins, etc.

The revealed objects should be photographed and indicated in a report and plan (map) to mark the exact position of each object, its outer appearance and condition, material from which it was made (at least approximately) and presence of deposit traces, including those of explosives. Remains of the latter could be revealed both on ammunition elements and on damaged objects, clothes, etc.

Damages are recorded with reference to their location, type (through hole or dent), size, shape and twist of marginal sites.

The removed objects are packed separately and sent to an expert to establish the design of a given special device and its operating principle, and to determine the materials used for manufacturing it and the type of explosives used. The said expert will also clarify where such explosives are normally used and whether they may have been home-made. It is also important to establish the degree of professional training of the person who could manufacture a home-made device.

Chapter 5

CRIMINALISTIC STUDY OF DOCUMENTS

1. WHAT IS TO BE CONSIDERED A DOCUMENT AND WHY THE NEED TO STUDY IT

A document is understood to be written report concerning specific facts of legal significance. These may be facts that reveal the occurrence, presence, change or termination of specific legal relations, and factual circumstances significant for a given criminal, civil or administrative case. A document is not necessarily merely a written act. Its contents may also be expressed by telegraphic, short-hand and scientific symbols; schemes; drawings; and/or plans. Such information may be stated both directly by people or with the aid of special equipment, e.g., typewriters, printing machines, computers and sound-recording and photographic devices.

Documents representing material evidence constitute the bulk of materials that are subjected to criminalistic study within the framework of criminal proceedings. Such documents include those that served as tools of a crime or retained traces of a crime; those that were objects of criminal acts by the accused; and those that could help disclose a crime, establish its factual circumstances, reveal the guilty, overturn an indictment, or mitigate the guilt of the accused.

One must distinguish between genuine and forged documents. The former are those that contain reliable evidence and the latter—those whose contents or attributes do not correspond to reality. In this case, one should distinguish two types of forgery, namely, intellectual and material. Intellectual forgery describes an act whereby a formally correct document containing false evidence has been drawn up and issued. Material forgery involves changing the contents of a genuine document by introducing false evidence instead of the initially correct information.

This could be done by erasures; handwritten or typewritten additions and corrections; substitution of pages; and so on. Documents with material forgery may be classified into: (a) partly forged, and (b) completely forged. In the former, we observe traces of changes in the original text (erasures, etching, and/or corrections). In the latter, criminals may use stolen or illegally made forms, or stolen or home-made seals, or perhaps forge the signature of some competent or responsible official.

The criminalistic study of documents may be classified into two categories: 1) The study of handwritten texts (forensic expert examination of handwriting), and 2) Technical criminalistic examination of documents by experts.

In studying handwritten texts, the following goals are pursued: (a) to identify the executor and author; (b) to establish that different texts have been executed by the same person; and (c) to establish that different persons have executed fragments of a given document.

Diagnostic studies help establish the sex, age, and other characteristics of the executor of a given text and to determine how long ago it was written.

The technical criminalistic examination of documents includes:

1. Determining the way a document was made and to identify the writing materials and implements used.

1.1 determining the group to which the document material belongs and identifying the latter;

1.2 determining the group to which writing instruments and tools, typewriters, printing equipment, types and printing forms belong and identifying them;

1.3 identification of seals and stamps;

1.4 determining the group to which the materials with which strokes (in ink, pencil or other dying substances) were made belong and identifying those materials;

1.5 determining the group to which other materials, e.g., sealing wax, glue, etc., belong and identifying them.

2. Restoration of damaged documents and texts therein, specifically:

2.1. restoration of torn documents;

2.2. reading texts in burned documents;

2.3 restoring faded, effaced and/or scraped-out texts;

2.4. reading ink-stained, soiled or otherwise illegible texts;

2.5. restoring texts in other cases (by traces on carbon paper or by pressure traces;

3. establishing forgery and relevant techniques, viz.:

3.1. erasures;

3.2 etchings and wash-offs;

3.3. additions, inserts and/or alterations;

3.4. copying involving technical processes;

3.5 other types of forgery, e.g., pastings, substitution of pages, regluing of photographs, etc.

4. Determining the "age" of a document and of the text therein:

4.1. determining the "absolute age" of a document;

4.2. determining the relative date of and sequence of several texts in the same document.

5. The study of photographic documents:

5.1. identifying by picture the photo printing devices used;

5.2. identifying negatives;

5.3 determining the printing conditions and the photo development and printing process used;

5.4. studying photographic materials.

6. The study of documents supplied with special protective devices:

6.1 studying fraudulent money, bonds and other securities;

6.2 examining personal documents, e.g., passports, driver's licenses, graduation diplomas, etc.

7. Reading secret writing and invisible texts:

7.1 reading texts written with sympathetic ink or with substances invisible under normal conditions;

7.2. reading cryptograms.

2. FORENSIC STUDY OF HANDWRITING FROM ANCIENT TIMES TO THE PRESENT

Already in the middle ages references were made to persons who compared handwritings—the first experts in the study of handwriting. Their art had a long way to go before it became scientifically credible.

In fact, one cannot really describe the examination of handwriting at that time as an expertise.

Such "expertise" was not doubt readily used to falsify evi-

dence. For example, the expert could use general phrases which would commit him to nothing: the scrutinised handwritings were "generally similar" or "common in character". And that was precisely what handwriting experts did when Nikolai Chernyshevsky, a 19th century Russian revolutionary-democrat writer, was falsely accused of state crimes.

Chernyshevsky had no difficulty in disproving the calligrapher's claim that he had written a certain note.

Thus, devoid of a sound scientific foundation, the examination of handwriting compromised itself. The weakness of expert examination of handwriting that prevailed in the courts for so long was, in fact, the main reason behind the traditional distrust toward its investigative significance in general. Graphologists, representatives of yet another trend in the study of handwriting, tried to rectify the situation.

Back in 1622, Camillo Baldi of Italy published a treatise called *How to Distinguish Solely by Handwriting the Nature and Characteristics of the Writer.* This was the first formal attempt to analyse a writer's character by his handwriting.

France was the first country to officially recognise the expert examination of documents. In 1570, a corporation of handwriting experts was formed in Paris, and in 1595 King Henry IV granted it a patent on performing relevant investigations. In 1727, Louis XV reorganised the body into a special academy. In 1792 this was disbanded and a group of engravers and calligraphers took over its duties.

In 1774-1778, Johann Kaspar Lavater, a scholar from Zürich, published his truly sensational *(Physiognomic Fragments) Physiognomische Fragmente zur Beförderung der Menschenkenntis und Menschenliebe. 1774-1778,* in which he wrote about the amazing similarity between human speech, gait and handwriting. In 1792, under the influence of Lavater's works, privat-dozent Groman from Wittenberg published a treatise entitled *A Study into the Possibility of Determining Character by Handwriting,* in which he declared that one could establish a person's height, voice and even eye and hair colour by his handwriting. Two-and-a-half years later, Baldi's ideas formed the basis of the then sensational *The Mysteries of Handwriting* by French abbot Jean Michon, who asserted that a direct relationship exists between a person's handwriting and character.

This gave rise to much literature on graphology; specialised journals and graphologic societies began to appear. Graphologists turned to forensic practice as well and demanded that their methods be used in the examination of documents in court.

Criminalists, too, seemed tempted to use graphology. For example, Hanz Gross in his *Manual for Court Investigators* noted that it would be highly important for the court investigator to learn to guess people's characters by their handwriting.

Yet, what appeared so tempting in theory was each time rejected by practice in court. All attempts to use graphology in the forensic examination of documents ended in failure. The graphologists' conclusions were either so remote from reality, or so vague and indefinite, as to make any sound conclusion totally impossible. More often, however, graphologists simply resorted to the techniques commonly used in comparing handwriting, ostensibly forgetting that they had claimed that human character could be discerned from handwriting.

Alfred Binet, Director of the Sorbonne Psycho-Physiological Laboratory, submitted for examination to well-known and competent graphologists a collection of handwriting samples belonging to men and women of different age and professional groups. These included not only great scientists and celebrated philosophers but criminals as well. The results of a subsequent graphologic analysis spoke for themselves. For instance, Charles Brown-Séquard, a prominent physiologist and President of the French Biological Society, was characterised as a dreamer of mediocre intellect, a man so impressionable that even his common sense suffered. On the other hand, a famous bandit who had committed innumerable robberies and four murders was characterised as a man so kind as to be described as an altruist.

The great Honoré de Balzac also fell victim to his passion for graphology. Once an elderly woman offered him several notebooks and asked him to determine what the future had in store for their owner. Balzac scrutinised the handwriting and replied that the pupil was dull and would amount to nothing. But there was no end to his confusion when the woman laughingly exclaimed: "Oh, maestro, how is it that you don't recognise your own notebooks?!"

Neither handwriting experts nor graphologists had anything to

do with criminalistics. Actually, the first criminalistic method for examining handwriting was Alphonse Bertillon's method of describing distinctive marks (Bertillonage). Bertillon proposed that graphology be based on the same principle as other types of criminalistic identification, i.e., on the features of handwriting that are distinguished by greatest variability in different people and, at the same time, most constant in a single individual. He suggested that distinctive marks of a given handwriting be assessed in precisely measurable terms. The method of describing distinctive marks, like other suggestions of Bertillion, then in the zenith of his glory, soon became widely known. However, in practice, his technique also proved groundless, as shown by his expert examination of the notorious *bordereau,* a document containing secret information. It was claimed that the *bordereau* was written by Dreyfus, a French General Staff officer accused of spying. Bertillon, a court expert at Dreyfus' trial (one of the most famous political lawsuits of the 19th century), drew the conclusion that the *bordereau* was written by the accused. However, this proved wrong. True, there are grounds to believe that the creator of the method of describing distinctive marks might have erred intentionally. But later, in trying to justify himself, he stated his disbelief in the expert examination of handwriting, insisting that it was good only to prove that the individual was ill-natured. Bertillon then argued that the method should be abandoned.

Fortunately, the history of the expert examination of handwriting did not end on this pessimistic note.

Edmond Locard, a French criminalist, having grasped Bertillon's idea on measuring handwriting proportions, developed his own method of expert examination which he termed "graphometric". Locard recommended that the expert plot a curve, depending on the measurement results of, say, the width and height of letters, of their elements and intermediate intervals. A similar curve was to be plotted from the measurement results of signs in some questionable document. If both curves coincided or corresponded structurally, this would show that both documents were executed by the same person; if they did not, it would mean the documents were executed by different people, even if the handwritings appeared to be similar.

However, the graphometric method also proved methodologi-

cally groundless, since it characterised handwriting only quantitatively and simply ignored all its qualitative diversity.

3. SCIENTIFIC FUNDAMENTALS OF FORENSIC STUDY OF HANDWRITING

The Soviet theory on identifying an individual by his handwriting is based on entirely different principles.

In criminalistics, "writing" is understood to be an object of investigation that includes both written speech and handwriting. Written speech encompasses the lingual means of expressing thought. The formation of writing habits is influenced by very diverse factors, e.g., knowledge of grammar and literature, different styles of exposition, profession, local dialects, communication with specific people, native tongue (if the document has been executed in another language), certain diseases of the central nervous system, etc.

Handwriting is a locomotory habit, with which we reproduce written signs and their word-forming combinations. A handwriting's stability and individuality are the qualities with which an expert in criminalistics could identify the executor of a manuscript or its individual fragments, a signature, for instance.

In studying handwriting stability, experts in the study of handwriting proceed from the theory of I. P. Pavlov, the great Russian physiologist, on a dynamic stereotype, which he understood as a well-arranged and balanced system of internal neural processes. This stereotype also occurs as a result of training and continued improvement of writing habits, and eventually becomes automatic. The writer is no longer occupied with grasping the mechanism whereby letters take their form and are joined; nor does he give special attention to observing the proper intervals between words, and so on. Instead, he prefers to concentrate on the contents of the document being written.

The locomotory writing habit is strictly individual in every writer, and this is conditioned by the peculiarities of his anatomy and nervous system; by the individual results of the writing lessons he once took; by the specific adaptation of the writer to given writing conditions; and so on. As a result, his handwriting becomes individualised, and its distinctive features unique.

What would happen, then, when a man intentionally tried to

change his handwriting to imitate someone else's hand? He would have to consciously direct his movements to change his own handwriting; they would become slow and uncertain. The usual ease would be gone, giving rise to signs characteristic of an imitation of another's handwriting. Yet, the imitation itself would also become strictly individual. The picture would become even clearer if the writer resorted to some writing habit he is unused to, for instance with his left hand, mouth or toes. Even the imitation of block letters or someone else's signature would not help in this case.

The examination of documents played a decisive role in many sensational cases. One of these was the kidnapping of Charles Lindbergh's child, an event that stunned America.

After his non-stop flight over the Atlantic in 1927 Charles Lindbergh became America's idol, its national hero.

On March 1, 1932, Charles Lindbergh's child was kidnapped. On the day of the kidnapping, the parents had put the boy to bed on the first floor of Lindbergh's house. At 8.00 p.m. their maid servant discovered the child had disappeared. Prior to the event the parents and their maid were downstairs on the ground floor. The kidnapper left a letter near the bedroom window demanding a ransom of $50,000. The signature consisted of two intersecting circumferences with three neat holes inside. When the police arrived, they found in the bushes under the window a broken, wooden lean-to ladder, two footmarks on the ground and a chisel.

The kidnapping was instantly reported by radio to all police patrols, and all passing cars were stopped and checked; but the criminal had disappeared without a trace.

The letter he left was passed over to a well-known expert called Haring, who concluded that it had been written in disguised handwriting by an alien, most probably a German, who was, moreover, uneducated. The masked nature of the handwriting showed in that the letters were unnaturally slanted, and that some of the words were written upright and others inclined. Many words had spelling mistakes that betrayed the author's German origin.

Unfortunately, the expert's information was not used in tracking down the criminal.

In the following weeks, the kidnapper sent the Lindberghs

several more letters and notes. Without going into the details of this sensational case, suffice it to say that the criminal finally received the amount of money he wanted via a mediator. Naturally, the police had first recorded all the serial numbers. The kidnapper told the mediator where the child was, but the information proved to be false. Several days later the boy's body was discovered near the Lindbergh residence.

American banks began to check the serial numbers of all their depositors in order to identify the banknotes passed over to the kidnapper, and in the end this helped to track him down. His name was Bruno Richard Hauptmann, a German convicted twice of robbery in Germany before emigrating to the United States. Apart from other material evidence taken from Hauptmann's home, the police also took manuscripts that could serve as specimens of his handwriting.

The documents were examined by the most prominent US experts, and all their independent conclusions stated the kidnapper's notes were written in Hauptmann's handwriting.

Hauptmann's trial was no less sensational than the crime itself. The prosecution's main evidence was corroborated by the conclusions of handwriting experts and also by those of the expert who had examined the ladder found in Lindbergh's garden after the kidnapping.

All the evidence was so convincing that the defence was unable to deny. Hauptmann was sentenced to death, even though he failed to plead guilty.

4. IDENTIFYING A MAN BY HIS HANDWRITING

What then is the forensic study of handwriting and what handwriting features can be used to identify the author of a handwritten document?

Writing habits are classified as technical, graphical and orthographical. Technical habits are understood to be those that reflect correct ways of writing, including correct posture, manner of holding the writing device, correct position of writing paper in relation to the writer, etc.

Graphical habits are reflected in the ability to depict written symbols connected into words by movements of a hand holding a writing device.

Orthographic habits reflect the ability to correctly determine the literal composition and spelling of words.

The features reflected in writing make it possible to judge to what extent the writer has mastered technical and graphical habits; determine how coordinated his movements in writing are; and establish the manner in which he writes individual letters and their combinations.

The study of handwriting represents an analysis of its common and specific features. Common features are those that are typical of and inherent in the handwriting of many people. Based on their study, the expert provides a common characteristic of a given sample of handwriting.

Common features characterise:

(a) the level to which the person in question has mastered the technique of writing, and his ability to write quickly and with well-coordinated movements. In this level, one may distinguish highly developed, medium-developed, and poorly developed handwriting;

(b) the structure of handwriting, as determined with reference to highly developed handwriting, is divided into simple (close to standard samples of writing), simplified (devoid of individual letter elements), and complexified handwriting (when letters contain elements that are absent in writing samples);

(c) size of letters, viz. small (up to 2 mm high), medium (from 2 to 5 mm high), and large (over 5 mm high);

(d) inclination of letters, viz., to left, right, or vertically (a readily changeable feature);

(e) coherency, which reflects the ability of the writer to put down a definite number of signs without removing the writing device from the paper. Low coherency involves less than 2-3 letters, medium coherency from 4 to 6 letters, and high coherency over 6 letters;

(f) space, which is determined by the relationship of letter length and width. If the width of letters and the space between them are less than their height, the handwriting is termed compressed; when the letter width and height are equal, it is average in space; and when the width of a letter exceeds its height, it is characterised as sprawling;

(g) overall intensity of pressure is determined by the ratio between the width of a stroke made with and without pressure.

In addition to the above-mentioned common features, one may also study the topographical features that characterise the arrangement of the handwritten material, e.g., the presence, form and size of margins; placement of lines; and arrangement of salutations, signatures, dates, etc.

Compared with the common features of handwriting, specific features are more stable, less susceptible to changes, and in their totality could individualise anybody's handwriting. Specific features are characterised by hand movements in writing, whole letters or their individual elements; details of various proportions (e.g., dimensional proportions of strokes in a given letter, relationship of starting and ending points of hand movement in writing a letter, etc.); intervals in hand movement when writing a symbol; position of symbol elements with respect to the line; form and specifics of writing subscript and superscript elements; ways of joining letters; and so on.

In addition to handwriting features, one may also examine so-called features of written speech, i.e., analyse the meaning of a text, provided the manuscript is sufficient in volume. Features of written speech may also be studied when the author and executor are different persons, e.g., when a text has been dictated or typed.

Features of written speech include: (a) general literacy level; (b) writer's vocabulary; (c) style; (d) general speech structure; (e) arrangement of text depending on meaning; and (f) way of distinguishing most important passages.

Like features of written speech, the features of handwriting could be revealed even when the writer seeks to change them.

For a long time, different Moscow institutions and organisations kept receiving anonymous letters slandering and threatening an engineer from one of the city factories. Also, announcements defaming the man were put up at the factory and elsewhere. The suspect was a woman called G. Experts began to examine the texts of numerous anonymous letters and envelope addresses, and also the said announcements. All were written in cursive both with the right and left hand, and imitated block letters; five messages were even written in Morse code and decoded. Significantly, all the letters were similar in meaning and style of written speech, contained threats, mentioned the same facts and persons, and used identical phraseology.

The investigators took experimental samples of G.'s handwriting, including those written in Morse code, which was made available to her. All the examined texts coincided in features of handwriting and written speech with the experimental samples written by G., as did those written in Morse code, specifically with regard to dashes and dots, the arrangement of individual signs with respect to each other and linearly, and in relation to other features. The experts concluded that all the texts were written by G., who pleaded guilty in court and was sentenced.

A document (manuscript) to be examined and the handwriting samples of a person being checked are sent for forensic handwriting examination. These could also be free samples, i.e., manuscripts written by a person which have no relation to a given criminal case, e.g., diaries, letters, draft documents and even experimental samples of manuscripts purposely executed at the suggestion of an investigator, justice or procurator for subsequent comparative examination.

5. ASCERTAINING WHETHER ANY ALTERATIONS WERE MADE IN A DOCUMENT

To change the contents of a document, a malefactor may etch, rub off, and/or remove some fragments, and sometimes even paste in others.

In etching with a chemical reagent (acid, alkali) he decolourises the dye with which the text was written. Since the reagent affects both dye and paper, yellow, gray or brown spots appear on the etching sites, and the paper becomes rough and fragile. As a result, the dye of a new text may blur, and the protective netting of the document or ruling might bleach. Occasionally, individual strokes develop in the etched text. Such a document is examined in bright and oblique light and in ultraviolet rays. In the latter case, luminescence on the sites subjected to etching are clearly visible.

Erasure is a way to mechanically remove a text or its part. Signs of erasures are: strong ruffling of fibres; thinning of the paper on the erasure site; distorted ruling or protective netting, if these were present in the form; and blurring of the dye on the erasure sites. Erasures are revealed when examining a document in oblique light and under a microscope.

Adding letter and figure strokes, separate words and phrases to the original text is termed *additional writing*. This could be established by difference in dye tinges, which are revealed by colour-separating photography and examination in invisible rays. Additional writing can be identified due to differences in writing speed, since something additional could not be written quickly. Additional writing is also apparent by the way the text is arranged. If the space for adding something is small, one would have to write in a compact manner, and if it is too large, the writer would have to extend the words and letters. Finally, changes in digital notations could be established by checking the correspondence of quantitative designations with the sum totals.

Additional writing could involve sites where a document is folded. In this case, a microscope is used to reveal dye blurs, which could not have occurred if the text had been written or printed in a newly-made document.

If separate fragments were pasted in or pages reglued, an examination in ultraviolet rays would show the luminescence of glue particles. In the same way, an investigator could also establish that a photograph had been reglued on a document. In this case, he would take special note of the stamp impression on the picture and the adjacent area.

6. ASCERTAINING WHETHER THE IMPRESSION ON A DOCUMENT WAS LEFT BY A GENUINE OR FAKE STAMP

To forge a seal or stamp impression, criminals resort to many diverse techniques. Most often, they redraw the impression image; copy a genuine impression; and make a counterfeit cliché by cutting out letters on rubber, linoleum or some other similar material, or by setting typographic letters.

To determine whether a stamp is genuine, an investigator must ascertain that:

(a) the impression is strictly geometric in form;

(b) the type is standard;

(c) individual letters are not handwritten;

(d) the letters and figures in the impression are all similar in size;

(e) the same signs in different impression sites are identical in form;

(f) the letter strokes have the same thickness;

(g) the letter and figure axes and their base lines are not displaced;

(h) the emblem is correct; and

(i) the text elements are positioned proportionately.

When a stamp impression has been redrawn, the investigator might notice certain preliminary signs, e.g., pencil strokes and/or a dent from a compass arm in the centre of the impression.

In making a fake seal, the criminal often supplies it with a direct representation of a letter, not a mirror image; then, when printed this site in the text shows a mirror image.

If a stamp plate is set with typographic letters, the dye is not uniformly distributed on the impression, causing the dye to be pressed out beyond the letter margins. If a genuine impression has been copied, the investigator might discover carbon paper particles. Normally, any questionable impression is examined with a magnifying glass and under a microscope.

7. IS AN INVISIBLE OR POORLY DISCERNIBLE TEXT LEGIBLE?

Quite possibly so, if one resorts to technique developed by criminalists. A text may be dye-smeared or blood stained. It may also have been faded by time or be poorly discernible because of the masking tone of the background material.

Texts spattered with some substance, crossed out and/or poorly visible are photographed in infrared rays or developed by the infrared luminescence method. Ultraviolet rays are also used in the hope that the dye remaining inside the paper will luminesce. Especially good results can be obtained in using colour-separating photography by selecting light filters and negative photographic materials sensitised to various ranges of the spectrum*.

Occasionally, clean sheets of paper with traces of pressure from some writing device (ballpen or pencil) are subjected to criminalistic investigation and read by beaming light rays perpendicularly to the stroke lines.

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* For details, see Chapter entitled "Criminalistic Photography, Filming and Video Recording".

8. SUPPOSING A DOCUMENT IS BURNED, BUT NOT ENTIRELY...

The following stages are noted when a document changes its form under the effect of high temperatures: singeing (till 150°C), when the paper yellows and curls up; charring (150-200°C), when the paper blackens, strongly shrinks, becomes fragile, cracks and tears; and incineration (200-300°C), when the paper turns into powder (ash) under even the slightest mechanical effects.

Burned documents should be removed with great care and first sprayed with a 15% aqueous glycerol solution. They should be transported in a cotton-lined box covered with fine paper.

Various methods and techniques are used to restore the text of a burned document:

(a) colour-separating photography to make the text and its background more contrasting;

(b) photography in oblique light, if the text was formed by pressed-in traces from a writing device;

(c) photography in infrared light;

(d) treatment with fluorescent compounds;

(e) chemical clarification and bleaching techniques; and

(f) heat treatment in a muffle furnace by placing the document between two sheets of quartz heat-resistant glass. Under 300-400°C, the document would incinerate to make strokes clearly visible.

9. WHAT CAN A TYPEWRITTEN DOCUMENT REVEAL?

A criminalistic study of a typewritten document helps to establish the typewriter system, model or type; whether the whole document was typewritten on the same machine, or whether some fragments were typed on different typewriters; and whether or not a document was written using a specific typewriter.

Mechanical typewriter features reflected in texts are classified as common and specific.

Common features

(a) type size (élite, medium, and pica);

(b) size of indexing mechanism space or carriage space (distance between the axes of neighbouring letters);

(c) intervals between lines;

(d) type of keyboard, i.e., number of characters on one key; normally two characters, but possibly one on a complete keyboard and three on an abbreviated keyboard;

(e) set of characters, i.e., their total number which characterises the completeness of the type (ranging from 84 (42 keys) to 92 (46 keys);

(f) type pattern, determined by the peculiarities of the character design, letter width and presence and length of serifs—short lines stemming from and at an angle to the upper and lower ends of the strokes of a letter, and

(g) maximum line length: not over 24 cm in portable typewriters; from 24 to 32 cm in standard office typewriters; and up to 50 cm in twin-carriage typewriters.

Specific features

(a) type faults, e.g., warped characters or absence of serifs;

(b) deviation of a letter's longitudinal axis from vertical line;

(c) irregular intervals between characters;

(d) displacement of character base line either upwards or downwards;

(e) split or slurred impressions;

(f) irregular intervals between lines;

(g) unparallel lines;

(h) non-uniform staining of character impressions.

The examined text and experimental text samples typed on a machine undergoing inspection should be sent for expert examination. In studying the text, the expert must bear in mind that the typewriter owner may have remedied various faults after having written the text of the document.

Criminalistic scrutiny of a typewritten text makes it possible not only to identify the typewriter used but also the typist.

A warehouse manager had for a long time been stealing various goods. To conceal his theft he used a typewriter to forge invoices which he allegedly used to issue those items. The investigator on the case collected genuine documents typed by the accused to serve as samples for the expert to study his manner of typing.

A comparative study of forged and genuine documents established that the strength and uniformity of strokes, the manner of arranging the text, dates and titles of officials, the sizes of line

indentations, and the recurrence of technical errors were all the same. Based on all these facts, the expert concluded that the forged invoices had been typed by the accused.

In addition to documents typed on typewriters, a criminalistic investigation frequently deals with papers obtained by using other printing devices. Here, the main task is to identify the printing device on the basis of the common and specific features of the type. Moreover, the criminal can be exposed by peculiarities of Linotype or manual setting, or by characteristic features of the setting stereotype.

10. EXAMINING THE MATERIAL OF WHICH DOCUMENTS ARE MADE

The paper, dye, glue, etc., are examined to establish the identity of the paper belonging to torn document fragments, or to determine the common origin of the document and the paper batch from which it is made; to establish the similarity of the dying and gluing substances to those taken from the suspect; and to establish that various fragments of the same document were made with different dyes.

In the course of study, the expert analyses the physical and chemical properties of the materials and also their composition, reflectance, and so on.

Investigation methods include microscopy, gas and liquid chromatography; ultraviolet rays; and spectral analysis.

Many criminalistic investigations call for the examination of counterfeit banknotes.

In 1811, on Napoleon's instructions, the French began printing fake Russian money they planned to use during the 1812-1814 war against Russia to undermine her economy. After the war, the Russian government changed 25- and 50-rouble banknotes for new ones. However, the withdrawn banknotes proved to total 70 million roubles more than the newly issued paper money. Such was the impact of this French action.

The grand swindle perpetrated by the Nazis during World War II is widely known: the German government began to issue counterfeit American, British, and other banknotes. Counterfeiters today can only dream of such a "business", albeit they do occasionally scoop no small fortune. In July 1963, counterfeit-

ers in San Francisco forged around two million worth of 20- and 50-dollar banknotes, the largest batch of fake money ever printed in the USA. The clichés were made in a small house specially rented for that purpose, and the counterfeit notes were printed in the Alameda College printing shop, where one of the criminals had a regular job. The banknotes were then taken back to the rented house where they were chemically processed to try and make them look like used money.

However, when the criminals tried to sell the fake banknotes, they were arrested. A total of $2,237,490 was confiscated, and the counterfeit notes showed up in eighteen states. But the criminals managed to have spent only $27,000.

The manufacture of counterfeit paper currency has become widespread in the United States, where fake banknotes worth 60.8 million dollars were withdrawn from circulation during 1980 alone.

The examination of fake currency chiefly involves the study of the physical and chemical properties of the paper and dyes used. The method of making the money and the devices and implements used must also be discovered.

Chapter 6

IDENTIFYING A PERSON BY HIS APPEARANCE

1. DISTINCTIVE MARKS ARE IMPORTANT IN TRACKING DOWN A CRIMINAL

Identifying a person by his appearance is of major significance in searching for, registering and identifying a criminal.

Since ancient times descriptions of criminals have been used to help search for them. Back in 14 B.C., one could come across the following notice: "Fled to Alexandria: man called Herman, alias Neilos, young slave of Aristogen, born in Bambico, Syria, about 18 years old, medium height, beardless, straight legs, dimple on chin, lens-shaped wart on left side of nose, scar across mouth left corner, right wrist tattooed with barbaric characters."

Yet, to use a man's distinctive marks to search for him, register him as a suspect and identify them, these marks had to be classified scientifically. However, such techniques were initiated only in the 1880s.

Alphonse Bertillon, a French criminalist, developed a special system of methods for describing human features and called that system a "word picture". It was, in effect, an element of his system of criminal registration, and was essentially designed to establish strict consistency in describing a person in special, unambiguously understood terms. Bertillon's method was subsequently improved by Rudolf-Archibald Reiss, a Swiss criminalist, and is applied today virtually in its original form.

2. THE "WORD-PICTURE" METHOD

Human distinctive marks are divided into two main categories involving morphological and functional signs. The former include anatomic features, e.g., height, body built, appearance, etc., and the latter—characteristics apparent in movement, e.g., gait, comportment, gesticulation, mimicry, etc. In this case, patholog-

ic forms (anomalies) termed "distinctive marks" within the system of a word picture may also have criminalistic significance. These may be both innate features such as a hunchback, crossed eyes, etc., and acquired features such as scars, tattoos, etc. "Glaring features", i.e., strongly pronounced ones, such as bushy, continuous eyebrows, a very prominent nose, etc., may also be distinguished into a separate group.

An auxiliary group of features is composed of outer signs of clothing and other personal belongings such as canes, briefcases, etc.

The word-picture method for identifying and registering a criminal is essentially used because appearance involves highly numerous and diverse features which form a really unique and relatively stable set of characteristics.

Close similarity occurs very seldom, while two different persons can never be totally identical.

A word picture represents a systems description of features, chiefly of the face and head, to indicate their size, form and position and, in some cases, colour, too.

The size of body or face parts is estimated in relative terms, not in absolute figures, by visually comparing them with other body or face parts. For example, the forehead width would be determined in relation to the nose and mouth; the head size in relation to the entire body; and so on. In determining the said sizes, the investigator uses the terms *large, medium* and *small* or, possibly, *high, medium* and *low*. In adding "very large" and "very small", he obtains a five-term gradation. And, if one were to include "above average" and "below average", the gradation would become seven-term. In criminal investigation practice, a three-term gradation is normally regarded as sufficient, while in identification by expert examination the five- and seven-term gradations are used.

Positions of body parts are established in relation to imaginary vertical and horizontal planes to indicate, for instance, that the forehead is slanted backward, the chin protruding and the nose base turned down (see Figs. 18 and 19).

Colour is indicated for hair, eyes, birthmarks, tattoos and complexion, if the latter is unusual. The features of the face on which attention is concentrated in the word picture are described with the head in two positions: enface and in right profile

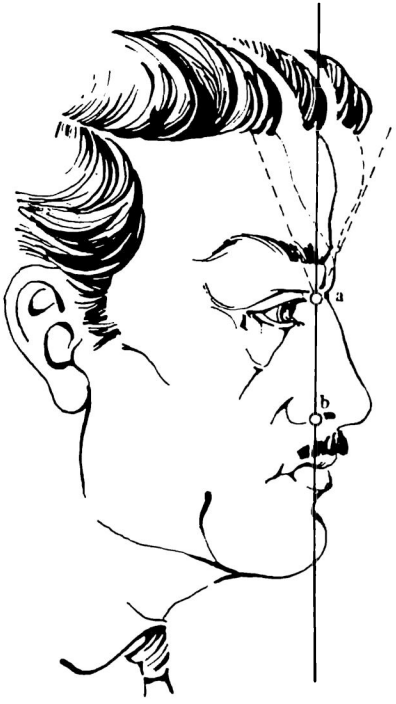

Fig. 18. Measurement of the receding and bulging forehead.

Fig. 19. Measurement of the receding and bulging chin.

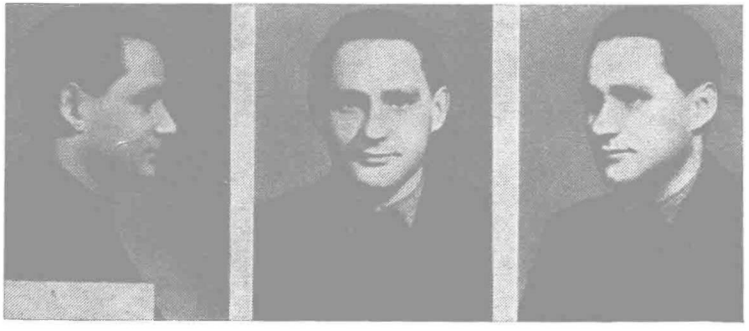

Fig. 20. Identification photography of the face, used in criminal registration by the word-picture method.

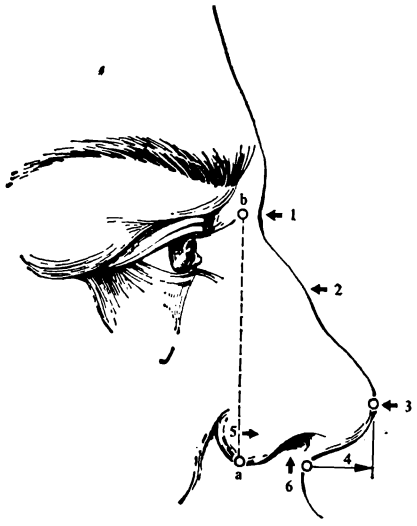

Fig. 21. Parts of the nose: 1—bridge; 2—ridge; 3—tip; 4—base; 5—wings; 6—nostrils, line *ab*—nose height

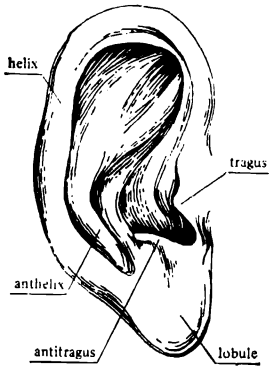

Fig. 22. Parts of the pinna

(a left profile would be described when it differs from the right one) (see Fig. 20).

Features are listed from common to specific to characterise the entire body and its parts (see Figs. 21 and 22).

Body and its features; head and its features	Characteristics of size, form and position (colour)	Special features and striking marks
a	b	c
1. *Sex*		
2. *Age*	Year of birth; in absence of exact data, approximate age from 30 to 40.	Looks younger (older) than his (her) age
3. *Figure*		
(a) height	(a) short (below 160 cm); medium (160-174 cm); tall (over 174 cm). For women, by 5-10 cm less, respectively.	Very tall or very short

a	b	c
(b) build	(b) weak, medium, strong (athletic)	very weak
(c) weight	(c) thin, average, stout	very thin or obese
4. *Head*		
(a) size	(a) small, medium, big	very small or very big
(b) form of sincipital part	(b) flat, dome-shaped or egg-shaped	
(c) occiput	(c) slanted, vertical, or projecting	very slanted or very projecting
5. *Hair*		
(a) abundant (thick)	(a) thick, average, or sparse	very sparse or very thick; baldness: frontal, occipital, sincipital, or total
(b) length	(b) short, medium or long	
(c) texture	(c) straight, wavy, curly, or frizzy	
(d) colour	(d) very blond, light brown, dark brown, black or red	
(e) contour of hairline	(e) straight, arch-like, wavy, or intermittent	
(f) hairline along temple	(f) straight, wavy, or intermittent	sidewhiskers
(g) hairdo	g) hair-cut: short, medium or long; hair combed back, parted on the right, left, in the middle, or bangs	
6. *Face*		
(a) proportions	(a) narrow, medium or wide	very narrow or very wide
(b) contour (form)	(b) oval, round, rectangular, square, or triangular with the base up or down; trapezoidal; or rhomboidal	very bulging; very concave; very lean; very plump; skin pigmentation: natural (freckles) or sickly (spots), presence of beard and/or moustache (form, colour, and size); wrinkles and their location

(c) contour in profile	(c) bulging, straight, indented	
(d) degree of fullness	(d) thin, medium, full	
7. *Forehead*		
(a) height	(a) high, medium, low	very high or very low
(b) width	(b) wide, medium or narrow	very wide or very narrow
(c) contour	(c) straight, bulging, concave	presence of bulges and supraciliary arches
(d) position with respect to vertical line	(d) slanted, upright or bulging	
8. *Eyebrows*		
(a) length	(a) short, medium or long	very short or very long
(b) width	(b) narrow, medium or wide	very dense or very sparse; bushy, shaved, continuous or scar-crossed
(c) form	(c) straight, arch-like, wavy, or intermittent	
(d) horizontal position	(d) horizontal, slanted outwards, stanted inwards	
(e) position in respect to eye orbits	(e) high, low, close or separated	
(f) colour		
9. *Eyes*		
(a) size of lid slits	(a) small, medium or big	very small or very big
(b) eye lid contours	(b) slit-like, oval, round or triangular	
(c) position with respect to horizontal line	(c) horizontal, slanted outwards, slanted inwards	very slanted
(d) position of eyeballs in eyesockets	(d) bulging, medium bulging or sunken	very bulging or cross-eyed (converging or diverging)
(e) reciprocal position	(e) converging or diverging	
(f) colour of eye iris	(f) pigmentary: light-brown, brown,	

	dark-brown, non-pigmentary: gray, light-gray, dark-gray, or blue	
(g) top lid	(g) open or closed	overhangs
10. *Nose*		
(a) size (length) of nose ridge	(a) long, medium or short	very long; curved nose ridge
(b) projected nose	(b) large, medium or small projection	very large or very small projection
(c) depth and width of bridge	(c) big, medium, little	
(d) nose width (distance between nostril wings)	(d) large, medium or small	very wide or very narrow
(e) ridge contour	(e) straight, concave, bulging, rectilinear, concavolinear or convexolinear	
(f) tip shape	(f) sharp, rounded or blunt	very sharp (peak-shaped)
(g) size of nostril cut	(g) small, medium, big	
(h) position of tip	(h) upturned, horizontal, or downturned	
11. *Mouth*		
(a) size	(a) small, medium big	very small or very big
(b) position of corners with respect to horizontal line	(b) downturned, horizontal, upturned	
12. *Lips*		
(a) height of upper lip (from nose base to lip)	(a) low, medium, high	very short, bifurcated
(b) width (thickness) of lip	(b) thin, medium, thick	
(c) protrusion	(c) protruded upper lip; protruded lower lip; generally protruded lips; generally retracted lips	
(d) colour (tone)	(d) bright, pale	normally tinged (colour)

a	b	c
13. *Teeth*		
(a) reciprocally positioned (locked) top and bottom teeth	(a) protruding upper teeth; protruding lower teeth; closed bite; open bite (incomplete locking of incisors)	very strongly protruding; blackening; yellowing; presence and form of artificial teeth, crowns, and/or fillings
(b) size	(b) small, medium, big	
(c) distance between teeth	(c) narrowly spaced; widely spaced	
14. *Chin*		
(a) size (height)	(a) big, medium, small	very big or very small; very narrow or very wide; with dimple; bifurcated; with transversal or longitudinal fold, etc.
(b) size (width)	(b) narrow, medium, wide	
(c) frontwise shape	(c) rounded, rectangular, triangular	
(d) sidewise shape	(d) bulging, sharp, flat	
(e) position against vertical line	(e) askew, vertical, bulging	
15. *Ear* (pinna)		
(a) overall size	(a) small, medium, big	very small, very big; total or partial absence of ear
(b) contour (shape)	(b) round, oval, rectangular, triangular	
(c) position against vertical line	(c) vertical, slanted backward, inclined forward	
(d) bulging or contiguous	(d) generally bulging, generally contiguous, bulging upper part, lower contiguity and vice versa	very strongly bulging
(e) helix (size)	(e) small, medium, large	
(f) position of antihelix	(f) retracted, protruding	
(g) tragus (size)	(g) small, medium, big	
(h) antitragus contour	(h) straight, convex, concave	

a	b	c
(i) position of antitragus	(i) horizontal, askew	
(j) lobule shape	(j) round, oval, rectangular, triangular	bifurcated; hole for earring
(k) lobule size	(k) small, medium, big	
(l) lobule position (degree of contiguity with cheek)	(l) contiguous, separated	
16. *Neck*		
(a) length	(a) long, medium, short	Adam's apple, wrinkles
(b) width	(b) thick, medium, thin	
17. *Shoulders*		
(a) size	(a) narrow, medium, broad	
(b) position	(b) sloping, horizontal, elevated	one shoulder higher than other
18. *Chest*		
(a) size (width)	(a) narrow, medium, broad	
(b) shape	(b) flat, hollow, bulging	
19. *Back*		
(a) size	(a) narrow, medium, broad	stooping; hump; curvature of spine
(b) shape	(b) straight, curved	
20. *Arms*		
(a) overall size	(a) short, medium, long	
(b) hand width	(b) narrow, medium, broad	
(c) finger size	(c) long, medium, short, thin, thick	total or partial absence of fingers; tattoos
(d) size of nails	(d) long, short, medium, wide, narrow	
21. *Legs*		
(a) overall size	(a) long, medium, short, thin, thick	very long or very short; total or partial absence of leg
(b) shape	(b) straight, O-shaped, X-shaped	
(c) foot size	(c) large, medium, small	

A word picture is used:

(a) in searching for unknown criminals by their descriptions established during initial investigatory and operative actions;

(b) in identifying persons known to criminal investigation agencies, e.g., escaped convicts or suspects in hiding;

(c) in searching for lost persons and in identifying dead bodies;

(d) in checking the identity of an arrested person;

(e) in identifying a person by expert examination; and

(f) in checking identification papers.

Descriptive information about a person may be obtained in different ways: by living witnesses, inspecting a dead body, examining photographs, and during an interrogation.

In obtaining information during interrogations, the investigator does not use word-picture terms so as not to mislead a witness or victim; however, he tries to obtain information about a maximum possible number of features.

A specialised artist will use the information to recreate a single "composite" portrait.

In investigating a crime, the Moscow Criminal Investigation Department is known to have made a total of thirteen finished drawings, all of which were shown separately to several witnesses who were then told to choose the three pictures they thought most closely resembled the criminal. Nearly all the witnesses pointed to the same three drawings. Then a last (fourteenth) "composite" portrait was made.

In another instance, a composite portrait helped Scotland Yard officials arrest the murderer of the wife of a celebrated British sculptor. Several witnesses described his appearance, and the drawn portrait proved so good that one of the constables could unmistakenly recognise and arrest the killer.

The complexity of making drawn portraits and the difficulties frequently experienced by witnesses in describing the appearance of a wanted criminal have prompted crime experts to develop a simpler and more accurate method for making "composite" portraits. Called "photorobot", the process is essentially this: a witness is shown a large number of photograph fragments of different individuals. He chooses the facial characteristics that

most closely resemble the criminal. These are put together and retouched to give a complete portrait.

Pierre Chabot, former assistant to Edmond Locard (the well-known French criminalist) is given credit for the idea of the "photorobot". Chabot described several cases where the "photorobot" was successfully used to disclose murders.

A modification of the "photorobot" was the Identikit system developed in the United States. Based on over forty thousand photographs of different persons from various countries, a set of 525 transparencies was accumulated each of which contained either the common characteristics of a face or its part or its characteristic features. By superimposing the transparencies on one another, the investigator could obtain a huge number of "composite" portraits which would be shown to the witness with a slide projector. This made it possible to make alterations where need be. However, since the Soviet population is characterised by very diverse anthropological features Identikit did not come to be widely used in the USSR. Hence, a group of Soviet criminalists under Professor V.A. Snetkov developed a special set of pictures reflecting the specific features of typical representatives of the male population in the European part of the USSR.

Naturally, the likelihood of detecting a wanted suspect would increase if the investigator or operative had his real photograph which could then be sent all over the country, not just within the precincts of one city.

Sometimes the search for a criminal by photographs may take an unusual twist, as was the case with two unlucky burglars who broke into the flat of a rich resident in Grenoble, France. The men were very happy about the loot and decided to take on-the-spot pictures of themselves in memory of the event. They did so with the flat owner's camera and run away with the stolen items. But they forgot the camera, and the police quickly tracked them down by their beaming faces on the film.

Bone remains such as skulls may also help make a word or cast portrait. The procedure is essentially based on the scientific method of plastic reconstruction developed by M.M. Gerasimov, a Soviet historian and anthropologist. The technique of reconstructing a face from a skull is based on using the correla-

tion between the soft tissues of the face (or head) and the skull bones.

In criminalistic practice, the reconstruction of a cast portrait would not be considered an expert examination, for it essentially involves the caster's purely individual approach. Yet, such portraits are nonetheless used to search for suspects.

4. IDENTIFYING A PERSON BY HIS FEATURES

This is done by comparing two and more face photographs (portrait expert examination); by superimposing the face picture on the skull picture; by identifying a person with X-ray photographs; and by forensic medical examination of body parts and bone remains.

Identification by photographic images is based on the comparative study of the anatomic features of people depicted in two and more pictures at different age periods, different times, alive and dead. In this case, the expert compares visually the shape, size and reciprocal positions of the face features by superimposing the pictures and making geometric constructions on the basis of individual face points.

The method of superimposing face and skull pictures is used when a photograph of a lost person is available and the skull (bone remains) of an unknown individual have been found. This technique was first used by John Glaister and James Brash of Britain when they investigated a criminal case in which a Doctor Ruxton was the accused.

In a gully, about one hundred miles from Ruxton's home, the dismembered remains of two women were found. The suspicion was that the remains, so disfigured as to be unidentifiable by conventional methods, belonged to Isabella. Ruxton's wife, and Mary Rodgerson, their maid servant. The victims' height, age, foot sizes, and fingerprints confirmed this assumption. In addition, both skulls were photographed to natural size and compared with the pictures of both disappeared women magnified to natural size. Superimposition revealed that the skull contours coincided with the women's features. Several years later, the method was successfully used in identifying a victim, this time not by the whole skull, but by its small and charred fragment.

This superimposition proves to be particularly convincing when

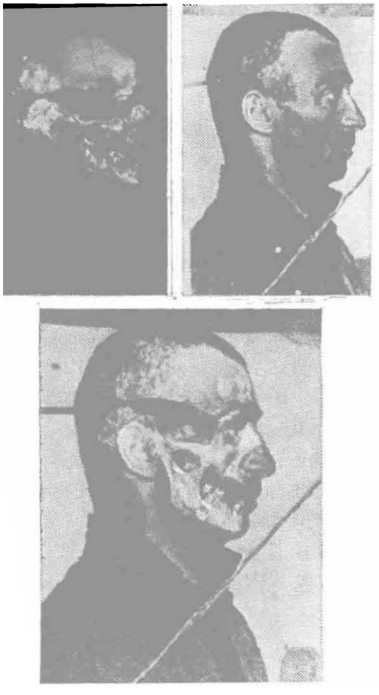

Fig. 23. Matching the face picture with the skull picture (profile)

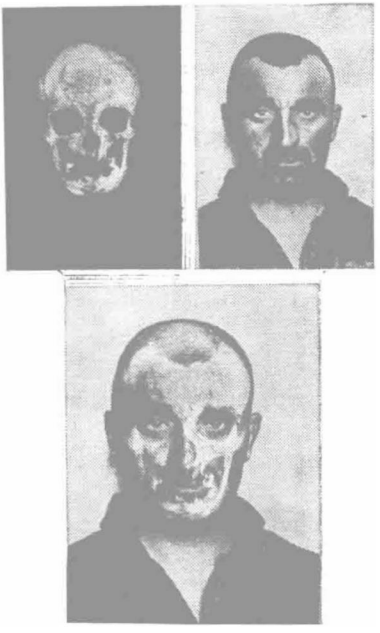

Fig. 24. Matching the face picture with the skull picture (en-face)

several lifetime photographs, in which the person in question is shown from different angles, are available. (see Figs. 23 and 24).

After World War II, the word picture method was repeatedly used in identifying Nazi victims.

Chapter 7

CRIMINALISTIC PHOTOGRAPHY, FILMING AND VIDEO RECORDING AS REGISTRATION AND INVESTIGATION TECHNIQUES

1. PHOTOGRAPHY COMES TO THE ASSISTANCE OF THE INVESTIGATOR

Everything that an investigator perceives in investigating a crime as relating to the case must be recorded. This is primarily done in recording investigatory actions, e.g., inspection, interrogation, search, etc. However, recorded statements, despite all their comprehensiveness, authenticity and the investigator's desire to encompass everything in the minutest detail, will never replace visual perception, especially when this concerns the site of an event, search and experiment. Besides, one must bear in mind that everything observed by the investigator should subsequently also be perceived by other participants in the proceedings, viz., the procurator, court, accused, defense, victim, etc.

In investigating crimes criminalistic photography is used for impartially recording material objects (environment, traces and material evidence). Criminalistic photography (sometimes also called forensic photography) is a scientifically developed system of techniques and technical devices used in photography during investigatory and search operations, and also in criminalistic examination of objects.

Photographs appended to records of investigatory actions document the objects reproduced therein and make it possible to clearly perceive the environment in which an investigatory action has been undertaken. They could substantially supplement the record, since they would reproduce everything in the field of view of the lens, not just individual objects.

Criminalistic photography is not only a means of reproducing objects, but an investigation method whose techniques could be helpful in revealing invisible traces and very minute features and could make etched documents and forgeries legible.

Criminalistic photography is widely used in criminal trials. However, this would be impossible in the absence of legal regu-

lations. Hence, the criminal procedure codes in the USSR and other socialist countries contain special norms allowing photography as a means of recording facts or artefacts. These norms clearly indicate what technical methods can be used and for what purposes.

Criminalistic photography is divided into *investigatory-operative* and *expert*. The former involves methods chiefly designed to reproduce objects, and the latter to investigate them. Investigatory-operative photography is used by an investigator, operative and/or specialist in the course of investigatory and operative actions, and expert photography in conducting expert examinations. The methods and techniques of investigatory-operative photography do not pose significant difficulties, but require a knowledge of the fundamentals of general photography.

Investigatory-operative photography distinguishes the types, methods and specific techniques involved in the art. Depending on the *method* or technique used, one may distinguish panoramic, measuring, reproduction, identification, stereoscopic and macroscopic photography.

A specific photographic technique is to select an angle, which determines the image structure. In this way, one distinguishes orientation, survey, nodal, and detailed photography.

Types of criminalistic photography denote a combination of methods and specific techniques for reproducing individual objects. Such types include photography of sites of events, places and results of searches, and also of living persons, dead bodies, footprints and other material evidence.

2. METHODS OF CRIMINALISTIC PHOTOGRAPHY

The method of *panoramic* photography is used to reproduce significantly long strips of land and elongated objects, e.g., buildings or wheel tracks, and also to take pictures in narrow premises.

Panoramic pictures could be taken either with a special or conventional camera. In the latter case, the object is photographed in parts to obtain several consecutive pictures, each of which covers the marginal section of the site reproduced in the previous photo, overlapping about 10 per cent of its area. All pictures should be taken in the same conditions as regards distance, illumi-

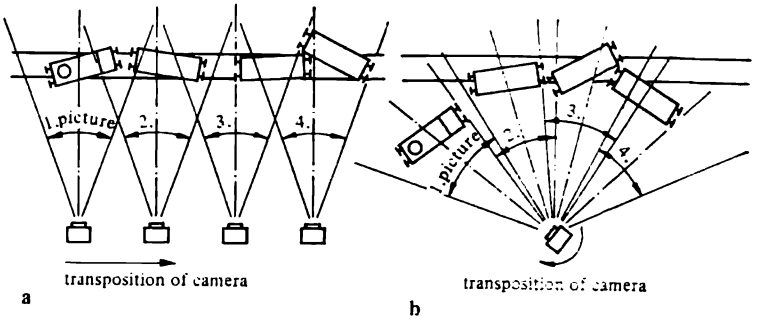

Fig. 25. Changing camera positions in panning; a)—linear panning; b)—circular panning.

nation, exposure, stop aperture, etc. The prints obtained from negatives should be cut to show the recurring objects contained therein, and then glued together.

In one instance, an investigator arrived at the scene of a railway accident and established the need to photograph a rather lengthy section of the track together with the coaches. To that end, he applied the linear method of horizontal panning. Having determined the foreground of the site to be photographed, he began taking pictures, shifting the camera parallel to the foreground (see Fig. 25). At the same time, using the camera distance scale, he took care that in each case the distance from the camera to the foreground would be stable so as to avoid different-scale pictures.

There is also the circular method of horizontal panning, in which the photographer remains at the same spot to turn the camera in the horizontal plane round the tripod (or an imaginary axis in the absence of a tripod) (see Fig. 25). Circular photography is used when the objects are equidistant from the centre (camera location), like, for instance, when taking pictures in a backyard, square, etc.

Vertical panning may also be used. In one instance, the scaffolding around a house under repair collapsed. On arriving at the scene, the investigator established that the scaffolding had been secured in a lesser number of points than required under existing technical regulations. To show this, the entire building had to be photoghaphed from top to bottom so that all the sec-

tions would be consecutively visible to see exactly where the scaffolding grapples were present or absent. This could be achieved only by vertical panning.

Measuring photography is performed if it is considered necessary to use the pictures to calculate the size of objects and the distance between them. Measuring photography is divided into scale and metric photography.

Scale photography is used to take pictures of individual objects. e.g., criminal tools, footprints and other items. Virtually any object representing material evidence should be photographed according to the rules of scale photography. These rules are rather simple. Together with the object, one photographs a centimetre and millimetre ruler which serves as a scale. The picture shows the object and the image of the scale ruler alongside. Any dimension could be measured with this scale, since both the object and the ruler would be equally diminished or magnified. However, for the object and the ruler to be equally diminished, one must strictly observe two conditions: (a) place the scale ruler not simply alongside the object but in the same plane with the photographed surface; and (b) position the camera so that the optical axis of the lens is perpendicular to the photographed surface. It would be inadvisable to place the ruler on the object, for some of its features would be concealed.

Metric photography is used to take pictures of individual objects and sets of objects located in some room, building or locality. This technique makes it possible to calculate not only the dimensions of objects, but to determine the distance between them. Metric photography involves quite a number of techniques, e.g., depth scaling (measuring tape), squaring, or photographic surveying (photogrammetry), etc. For compact cameras, most frequently used by investigators, depth-scale photography may be recommended. A 10-15m-long graduated measuring tape is used as that scale. Each graduation mark is equal to the lens focal distance used in photographing with the given scale.

When taking pictures, the measuring tape is placed on the floor or ground so that its beginning is directly under the camera at the point of a plumb bob dropped from the lens front surface. The remaining portion of the tape is placed within the photographed site. The resultant picture reveals images of the site, metric tape and distance scale (see Fig. 26). Measurement by

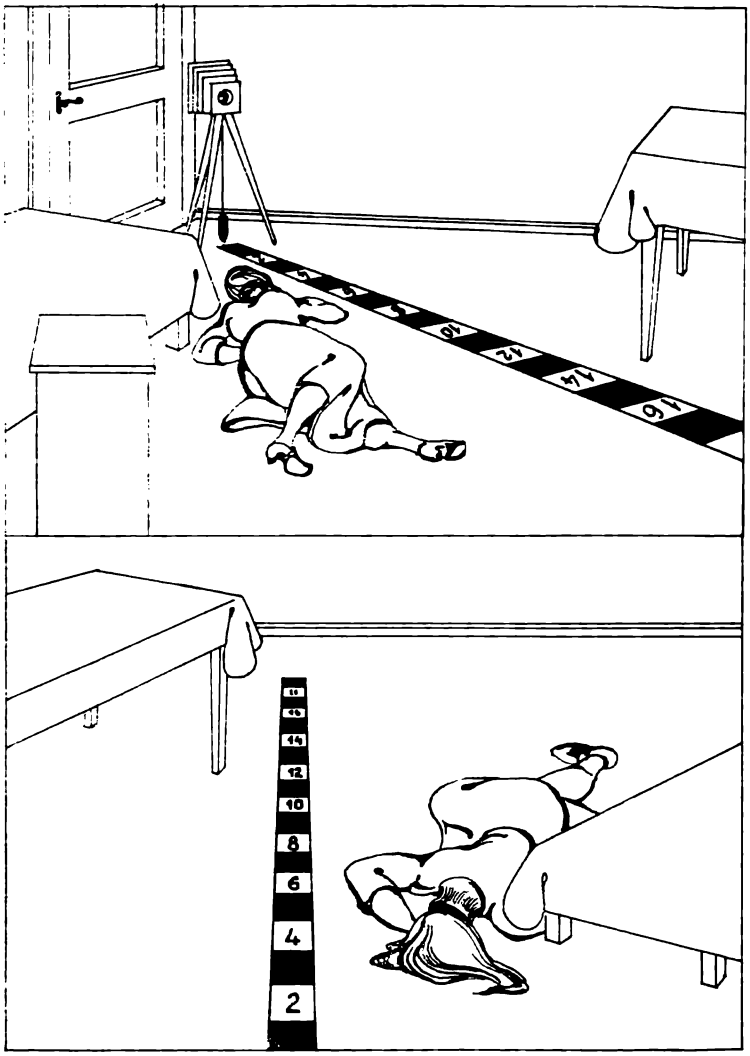

Fig. 26. Deep-scale photography.

such a picture is based on the dependence of negative diminution (the decrease at photographing) on the distance between the camera lens and the object. The greater the distance, the

greater the image diminution. The existing dependence is expressed by the formula $\frac{a_2}{a_1} = \frac{F}{F_1 - F}$, where a_1 is the size of the object; a_2 the size of the image; F the main focal distance; and F_1 the distance from the lens to the object. In other words, compared with the object, the image is diminished by the number of focal distances minus one by which the object was distant from the lens. Conversely, if there is a need to obtain an image diminished by a factor of 20, one should place the camera at twenty-one focal distances (20 + 1) from the object, or since F = 5 cm at a distance of 105 cm (5 x 21).

The size of an object photographed with a depth scale is estimated as follows. First, one determines the depth scale graduation number corresponding to the horizontal plane in which a given object is situated and then subtracts 1(F) from the number indicating the graduation number (F_1) in conformity with F_1-F. The result is the photographic diminution factor. After that, having measured by the picture the image size of the given object, one multiplies it by the diminution factor to obtain the object's true dimensions. For example, an object's length on the picture equals 2 cm, and the object is located so as to correspond to graduation mark 37 of the diminution scale, i.e., at 37 focal distances from the lens. Consequently, diminution is 36-fold (37-1). Hence, the true length of the object equals 2 cm x 36 = 72 cm. However, one should bear in mind that such calculations are recommended in cases where the print is made from a negative by the contact method. If the print is made with magnification, the calculations will be somewhat different, and the resultant product must be divided by the magnification scale. For example, if fourfold magnification is used in making prints, i.e., when a 9 x 12 cm picture is made from a 24 x 36 mm still, the above-cited example assumes the following form: (2 cm x 36) : 4 = 18 cm.

To measure the distance between objects in depth, one calculates the distance from the camera to the frontal plane of every object. Supposing the first object is located in the 20th graduation plane, then the distance from the camera to that object amounts to 20 focal distances, i.e., to 5 cm x 20 = 100 cm. If the second object is located at the 30th graduation mark, the distance to it equals 5 cm x 30 = 150 cm. Hence, the distance be-

tween objects amounts to 50 cm (150 cm—100 cm = 50 cm).

The diagonal distance is calculated geometrically in conformity with the Pythagorean theory, which holds that in a right-angled triangle the square of the length of the hypotenuse equals the sum of the squares of the other two sides.

This method is the simplest of all, though not too accurate, since the error made in measuring by a diminished picture would increase on recalculating for the natural size by as many times as the object was diminished during photography. If one makes a measurement mistake by 1 mm, and the photographic diminution factor equals 20, one would ultimately make an error of 2 cm against the true size.*

Reproduction photography is used to take pictures of flat objects, e.g., documents, drawings, tables (lined reproductions), photographs, paintings, and illustrations (half-tone reproductions).

This technique is used to photocopy documents and or photographs, for instance when sending out pictures of some wanted person.

In reproduction photography, the document is placed on a flat surface and normally pressed with a glass sheet to exclude unevenness. A graduation ruler is placed alongside the document so that any fragment might later be measured by the photograph. When photographing, the document should be illuminated uniformly; the optical axis of the lens perpendicular to the photographed surface; and the lens central point above the crossing point of the diagonals connecting the document corners. Reproduction photography may be performed with any camera that ensures the fulfilment of the above-mentioned conditions, but criminalists usually apply portable reproduction devices.

A reproduced image of a document may also be obtained without a camera, by the so-called contact method. To that end, one should use special photographic paper, which must be tightly pressed to the document (in the dark), illuminated with a light beam and then processed as a negative. The result is a negative

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* Stereophotogrammetric photography is the most up-to-date and promising technique in measuring photography.

image, from which a print is made using the same technique. The method is simple, but the results are inferior to those obtained with cameras.

For urgent reproduction of copies, one may also use xeroxing, blueprinting, thermocopying, etc.

Stereoscopic photography makes it possible to obtain a three-dimensional impression of the objects shown in the picture, and this helps to better judge about their form and reciprocal position.

Using human binocular vision it is possible to obtain a stereoscopic (three-dimensional) impression due to the fact that the left and right eye see an object separately. Hence, stereoscopic photography may be performed so as to imitate the manner in which the right and left eyes perceive an object, i.e., from two points separated by a distance called the baseline. The baseline equals the average distance between the pupils of human eyes (65-70 mm).* The obtained images are printed to a size of 40 x 60 mm and pasted onto a cardboard so that the distance between their centres equals 65 mm. The resultant stereoscopic image is observed through a stereoscope comprising two converging lenses, one for the right eye and the other for the left; by bringing these lenses closer to the stereoscope, and by distancing them from the latter, one seeks to obtain a distinct image.

Stereoscopic photography may be performed using special cameras, such as Sputnik (USSR), Belplasca (GDR), Kodak Stereo (USA), and others.

Stereoscopic photography is also feasible with any conventional camera supplied with a stereoscopic attachment representing a combination of mirrors and lenses that provide both stereoscopic pictures on the same image of the film. The attachment is put onto the camera lens before beginning to photograph.

A photogrammetric camera is used in inspecting the scene of a traffic accident. The camera is installed on a special automobile laboratory to make stereoscopic photography possible within just a few minutes. The required distances are measured by the resultant pictures using a stereocomparator.

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* Stereoscopic photography of significantly distant objects, e.g., at scenes of traffic accidents, is performed with the base-line increased by several dozen centimetres.

Identification photography* is used in taking pictures of living persons and dead bodies for subsequent registration, identification and expert examination.

In this case, the pictures reveal increasingly clear features of the face and head. Negatives and prints are not to be retouched. The basic pictures are those in which the head is shown enface and from a right profile (see Fig. 20). If the face has distinctive marks, e.g., scars, birthmarks, partial absence of ear and/or nose, etc., the left profile should also be photographed. Additional pictures could be full-length portraits and body turned at 135° (left and right profiles).

When taking pictures, the investigator should make sure that the head is in the correct position, tilted neither frontwards nor backwards.

An identification photograph is framed so as to obtain an image to the waist. If the person to be photographed normally wears spectacles, he should take them off; hats should also be removed in cases where pictures are to be taken for criminal registration. When taking a profile picture of the face, the hair should not cover even the slightest part of the ear, and the face itself must be composed. Photographs are taken against a gray neutral background with artificial lighting from two sources, one providing direct light from behind the camera and the other from the left hand side. The camera should be placed at the subject's eye level.

Registration pictures should be printed so that the images correspond to one-seventh their natual size.** Prints are pasted alongside, profile picture to the left and full-face picture to the right.

Identification pictures of dead bodies should be taken, preferably in the morgue, in five views: full-face, left and right profile, and left and right views of body turned at 135°.

Macrophotography is used to take pictures of small objects,

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* In many textbooks, it is termed *signaletic* (from the French *signaletique*, meaning *sign-imprinting*).

** To that end, the camera is placed away from the face by eight focal distances. The resultant negative may be printed by the contact method. For compact cameras, another method is used. A 28cm-long paper strip is secured to the front of the clothes of the person being photographed, and on the resultant print, this strip should equal 4 cm.

traces, details, and/or document fragments. The technique falls between conventional and microphotography and involves scales from 1:5 to 20:1—30:1 i.e., from five-fold diminution to 20-30-fold magnification. It differs from microphotography in that the image is obtained by the camera lens, not by the microscope lens.

Natural-size and larger images may be obtained provided the camera design allows for extending the bellows by two and more main focal distances. However, things become more complicated when using conventional compact cameras designed to take pictures from a distance greater than 0.65-1 m. In the former case, the diminution factor would be 12 (for a lens with F = 5 cm), and in the latter 19. This limit could be surmounted only optically, i.e., by reducing the focal distance of the lens by using an additional lens. In this case, the image scale would increase; but, at the same time, the lens resolution would drop to reduce focal depth.

To photograph an object from a lesser distance, i.e., in a larger scale, the photographer would most frequently additionally extend the lens, i.e., increase the distance from the lens to the film. To that end, he would use extension couplings (rings or tubules), i.e., short hollow threaded metal tubes. The rings are wound together and secured between the camera body and lens. Depending on the desired scale, the photographer selects a separate ring or a combination of rings, referring to available tables. If the camera has a speculum sighting device, image focusing should not involve any significant difficulties. When using cameras with range finders, they should be positioned in relation to the object by measuring the distance from the object to the camera back wall. In this case, one refers to the following table for large-scale photography:

Scale	Distance from film to object in focal distance units	Additional extension of lens
1:1	4.0	1.0
2:1	4.50	2.0
3:1	5.33	3.0
4:1	6:29	4.0
5:1	7:20	5.0

Inasmuch as the use of extension rings increases the distance from the lens to the camera plane, the brightness of the optical image decreases compared with that obtained with a normal lens position. Hence, in determining exposure time, one should proceed from the greater stop aperture (D_1), not from the stop aperture (D) set on the lens. $D_1 = D(n + 1)$, where in is the photography scale.*

3. TYPES OF CRIMINALISTIC PHOTOGRAPHY AND SPECIFICS INVOLVED IN PHOTOGRAPHING CERTAIN OBJECTS

At the site of an event, pictures are taken to establish the surroundings; the objects present there; and the revealed traces, criminal tools, dead body or bodies, and so on. To that end, one uses all the known techniques, e.g., orientation, survey and detailed photography, which will give several pictures differing in size of photographed area and in degree of object diminution.

Orientation photography is used to take picture of the site of an event together with the surroundings. The picture should show not so much the territory of a given site as the surrounding structures, pathways, driveways, terrain, etc. (see Fig. 27).

Orientation pictures are taken from three locations, preferably from an elevated site, e.g., a hill or low structure. When inspecting a site in connection with a plane crash, orientation pictures should be taken from a helicopter.

Survey photography is used to take pictures of the site of an event without surroundings. This makes it possible to establish

Fig. 27. Orientation picture at the scene of an event.

* For instance, aperture 4 providing for good image focus has been set on the lens, and the scale is one-half of natural size. Then $D_1 = 4 \times (^1/_2 + 1) = 6$. In this case, in determining exposure with the true stop aperture, one should count graduation 6, not 4.

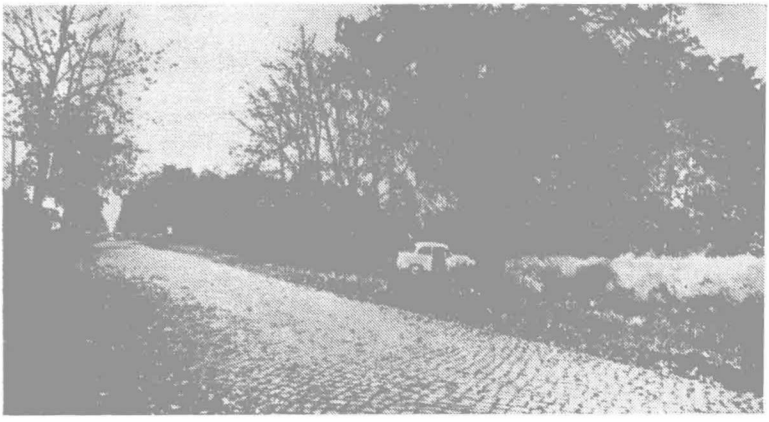

Fig. 28. Survey picture at the scene of an event.

the exact site of an event and the objects thereon (see Fig. 28).

Survey photographs are taken from a closer distance than orientation photography. The pictures are taken from several spots from opposite sides. This is called cross-photography. The pictures supplement each other and are interrelated by showing

Fig. 29. Nodal picture at the scene of an event.

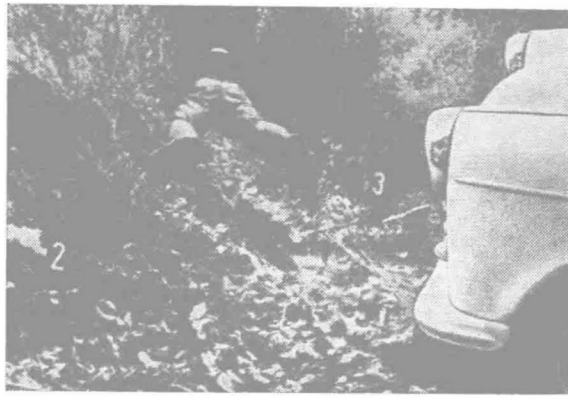

Fig. 30. Nodal picture at the scene of an event.

the same basic objects or reference points. Orientation and survey pictures may be taken by panoramic photography (panning).

Nodal photography is used to take pictures of the most important sites (nodes) and objects at the scene of an event (see Figs. 29 and 30).

A node (object) to be photographed is selected with consideration for the nature of the crime, and several such objects could actually be chosen. When inspecting the site of a burglary, nodal pictures are taken to show a break in the door; areas of disorder; the criminal's traces; and so on. In a murder case, the most important objects to be photographed are the body; traces of a fight; blood stains; and so on.

Detailed photography is used for taking pictures of outward signs of material evidence and traces. It would help to establish the criminal tools, bullets, cartridges, handmarks, footmarks, damages of vehicles, etc., revealed at the site of an event (see Fig. 31). Detailed pictures should be taken from such a distance that only the important object is shown. Detailed photography should always involve scale photography. If need be, detailed photography also employs extension rings used in macrophotography.

Orientation and survey pictures are normally taken at an early stage of inspection of the site of an event, and nodal and detailed pictures during inspection, after the investigators have

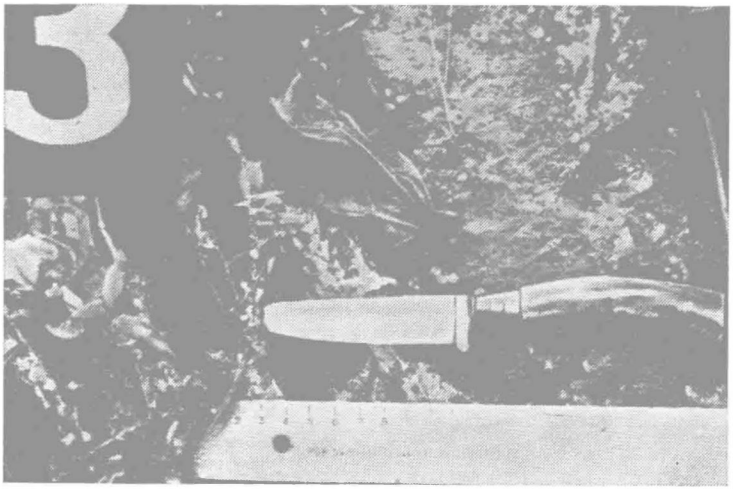

Fig. 31. Detailed picture at the scene of an event.

gotten some definite idea of what happened; of the main sites of the event; and of the revealed traces and other material evidence.

During a search, pictures are taken to record the process. Hiding-places and their contents are photographed as they are found, and items withdrawn during the search are photographed separately, using orientation, survey, nodal, and/or detailed photography.

Photography during an experimental investigation largely resembles that during an inspection and search, and is also designed to reproduce the scene of the experiment by means of orientation and survey photography. Afterwards, nodal photography is used to record the actions of the participant in the experiment, e.g., those demonstrating how the actual suspect broke into a room or apartment; transported the stolen items; and so on.

Photography of material evidence. First, an object is photographed where it was discovered, without changing its position or touching it. The obtained nodal picture should reveal not only the object but the items that surround it. Then material evidence is photographed so as to reflect its most substantial features, such as shape, size, configuration of individual parts,

faults, presence of paint, dirt, etc. The pictures are taken in accordance with the rules of scale photography.

Special care should be taken to illuminate the object, since this will determine the correct perception of its shape. Lighting should ensure a distinct reproduction of the image in all its details. To that end, crime photographers should normally use several (at least two) light sources, one for overall illumination of the object, and the other to light up specific details. When taking pictures in sunlight, a white screen. e.g., a sheet of compact paper, white cardboard or piece of white fabric stretched over a frame, could be used as an additional light source. This screen would reflect sunlight, directing it onto the object's darkened sites.

To get the best possible image, an object should be photographed against a light background so as to eliminate shadows. It is somewhat difficult to take pictures of chrome- and nickel-plated objects, whose shining surfaces flash during photography, e.g., pistols, knives, automobile parts, etc. Highlights could be removed by changing the lighting, which should be focused not directly at the object but onto a white screen (or several screens) that will reflect light onto the shining surface. Light filters are used to take pictures of shiny non-metal surfaces.

In taking pictures of objects, special care should be shown in photographing traces, damages and individualising markings, e.g., numbers, trademarks, and so on.

Photography of handmarks. First, one should take pictures of the general view of a given site or object on which handmarks have been discovered and then photograph the marks themselves. Single fingermarks could be photographed to natural size by macrophotography involving extension rings. It is even more important to have precise contrast and focus in developing these pictures. A picture is considered good if the pores of the skin are visible.

The success of trace photography largely depends on proper lighting. In principle, one could use any source; however, best results are obtained with a converging pencil. If the trace is over transparent material, e.g., glass or plexiglass, the light may be pencilled from the inverse side, but in such a way as to prevent it from entering the camera lens; this is called "translucent" photography. In other cases, light is directed at less than 90°

to the trace surface, and this is called photography in reflected beams. By changing the light direction or turning the object with respect to the light source, one can determine the position at which handmarks would be best discernible and then begin taking pictures. If one fails to photograph a perspiration mark in this way, the mark can first be powdered* and then photographed.

There are also special cameras for taking pictures of handmarks, e.g., EP-5 (Sirchie Finger Print Laboratories). The EP-5 camera can work with conventional photographic materials making it possible to obtain negative images and also by the Polaroid technique (diffusive reversal of photographic image) to obtain positives. To take a picture of a trace, the camera is placed with its open side turned towards the object with the trace. Focusing should be constant, stop aperture adjusted beforehand, and scale 1:1.

Another similar-type model SUV-6, in addition to the usual fixtures, is equipped with two ultraviolet illuminators. This makes it possible to photograph finger prints sprayed with luminescent powders.

These cameras may also be used to photograph other minute material evidence and document fragments.

Taking pictures of footmarks or shoemarks and vehicle tracks.

At the scene of crime, both aggregate and single tracks are photographed. When taking pictures of a train or rather long (one revolution) wheel track, the linear panning method is used. A tape measure or centimetre-graduated pliant folding rule is placed alongside and in the same plane with the tracks.

A single shoemark or most distinct tread track should be photographed separately. Such pictures are taken to reveal the shape, size and specific signs of the track as well as possible. Large-scale photography may be used.

To ensure the fullest reflection of specific signs in the track contour, special attention is given to lighting. Normally, one would use combined illumination involving direct and side fixtures. Direct lighting makes it possible to reveal the track shape and side lighting—its contour. If pictures are taken in natural light,

* See Chapter 10.

a white screen, e.g., a sheet of paper or white cardboard, is used for side illumination. The light reflected from that screen is directed perpendicular to the track's linear features to thereby increase the shadow contrast. This technique helps to make the features in the track base more distinct in the picture and to light up the deep shadows from the track walls. Pictures should be taken by the method of scale photography, using a centimetre- and millimetre-graduated rule.

Sometimes, prior to taking pictures of tracks, it is better to try to increase the degree of contrast. For instance, foot-or shoemarks would be sprayed with some kind of powder and tyre tread tracks on the victim's clothes sprayed with an atomiser. Earth particle traces would suck up moisture, and the trace would become darker to increase the image contrast.

Taking pictures of traces of burglary tools and implements also involves two stages. First, the traces are photographed using the nodal technique to give some idea about their number and location. Then scale photography is used to take pictures of specific traces to obtain an image in the frame maximal scale. Just as in taking pictures of footmarks, the photographer tries to use combined illumination capable of intensifying reproduction of trace details. Taking into account the sometimes complex configurations of burglary traces, it would be advisable to take several pictures of the same trace under different lighting conditions.

Taking pictures of dead bodies. When photographing a dead body at the place where it was discovered, one should first take a picture following survey photography techniques since this helps to determine the body's position in relation to the surroundings. Then, one should use the nodal technique from two opposite sides. In this case, the optical axis of the lens is directed perpendicular or slightly less than at 90° to the body's lengthwise axis (see Fig. 32). If the body is photographed from the feet or head, this leads to significant distortions in perspective; in fact, this is done only in cases of dire need, when one cannot photograph it from the side (e.g., when it is in a narrow passage), or to reveal a characteristic posture, e.g., in case of rape.

After taking a side picture of the body, one should photograph it from above. The large-frame cameras (9x12; 13x18) used for

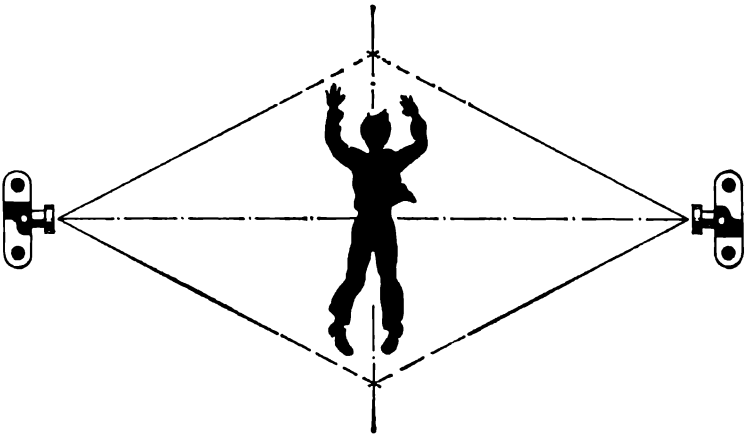

Fig. 32. Position of the camera in photographing a dead body.

that purpose are attached to a tripod, whose rod makes it possible to take vertical pictures. When taking single-image pictures of a body with compact cameras, the photographic diminution factor equals approximately sixty. However, a picture of that size would not reveal damage to clothes, bloodstains thereon, injuries, etc. Hence, in taking pictures of a dead body, especially from above, linear panning is advisable.

After photographing a dead body's original posture and position, one may shift and turn it over in order to take a picture of its concealed parts. Special attention is given to photographing body injuries and traces on clothes. This is done in line with the rules of scale photography, using a millimetre-graduated rule.

If the body has not been identified, one should photograph the face and head to register and subsequently submit the pictures for identification. The photography technique is the same as that for living persons, which we have already discussed. To identify the victim, one should also photograph distinctive marks, such as tattoos, scars, birthmarks, etc.

Pictures of documents are taken by the methods of reproduction, macro- and microphotography to reproduce the document's general appearance and those details (fragments) whose authenticity is questioned, e.g., stamp impression, signature, possible traces of erasures, etc.

4. WHEN FILMING AND VIDEO RECORDING ARE PREFERENTIAL

In investigating crimes, one resorts to filming to reproduce not only the environment, objects and signs related to a given crime, but also certain actions. For example, filming in the course of an experimental investigation would make it possible to reproduce break-ins involving some definite method, specific actions, and so on. Filming could also help reproduce elements of on-the-spot interrogation, when the person being questioned might show where the participants in the event were located, where they themselves were hiding or had hidden the stolen items, where they had thrown away their criminal tools, etc.

Filming is also the preferred method when there is a need to record a large number of objects or photograph particularly long sites, e.g., at the scene of a traffic accident. Before filming, the investigator must determine his objectives and specify what episodes and in what order to film; what the contents of each episode should be; and approximately how long it will last on the screen. This enables the cameraman to reproduce the needed episodes properly and sufficiently over a definite film length. In this case, the filming of episodes in their logical sequence is especially important, since this makes it possible to avoid the highly undesirable editing exposures and to screen the film in its original form. If this technique is used there will be no dissatisfaction with distorted reproduced images.

The location of the movie camera is very important. Also, orientation, survey, nodal, and detailed photography could be successfully used in filming. This involves a transfer from one magnification to another (by replacing lenses and attachments); also, the cameraman should film at different distances, seeking to reproduce most fully the important circumstances in the case. Filming positions should be noted in the investigation record and marked on the plan of investigation. Any movie camera may be used for the work.

Like filming, video recording would make it possible to accurately reproduce the dynamics of various events and actions. Inasmuch as no subsequent processing of the magnetic tape is required, the obtained images could be instantly reproduced and screened for the viewing by all the participants in an investigation, and also momentarily televised to help establish the

detainee's identity, to identify revealed objects, and so on.

Like filming, video recording involves a specific plan and definite points of recording and image scale focus and arrangement.

In inspecting the site of an event, a video recording may be preferred (over filming and photography) when one has little for doing the job because of the need to eliminate the consequences of a crime, traffic accident or some other event, when traces might be erased by bad weather conditions, or when the inspection takes place before the event has been fully investigated, for instance, during a fire.

Video recording with simultaneous sound recording is advisable when complex interrogation versions are to be registered. For example, when questioning at the site of a crime; when questioning a criminal who has voluntarily given himself up; or when questioning a person who cannot be present in court because of illness, travel, etc.

Video recording is used to register the testimony of persons whose life is endangered (victims of assaults, accidents, etc.), when questioning juvenile witnesses, etc.

The application of video recording should be noted in the record of the investigatory action in which it was used.

5. EXPERT (RESEARCH) PHOTOGRAPHY

The methods of research photography used in criminalistics help to reveal and register signs and details invisible to or weakly discernible by the human eye. The principal methods are microphotography, photographic change of contrasts and photography in invisible rays of the spectrum.

Microphotography is used to reveal, register and study the microstructures and microrelief of objects (articles, documents, traces and microscopic particles). The image is created by the microscope's optical system. There are several models of microphoto devices suitable for criminalistic investigations, and they incorporate an optical microscope and a camera. To simultaneously compare and photograph two criminalistic objects, one would use comparison criminalistic microscopes to register the coincidence of the microrelief in the traces left at the site of an event with those in experimental traces obtained in using an inspected

implement, or in traces on bullets or cartridge-cases with those on experimentally fired bullets or cartridges.

Microphoto attachments secured with special intermediate rings on the tubule of any microscope, including binocular stereoscopic microscopes, could also be used.

Microphotography involves negative photographic materials with high resolution, and this makes it possible to reproduce with high accuracy the details of some microrelief. The choice of suitable illumination would serve the same purposes. Objects may be photographed (a) with transillumination; (b) in reflected rays; and (c) with combined illumination.

The choice of magnification also depends on the nature of the object and the investigation objectives. For example, a 5-7-fold magnification of fingerprints, seal and stamp impressions or printed and typewritten texts would suffice to examine their specific signs, and this would, in effect, be macrophotography. Marks on bullets and cartridge-cases, traces of cuts and choppings, and the like are photographed with 15-50-fold magnification, while paper and fabric fibres, paint, dust and similar microparticles, are photographed with 200-400-500-fold magnification.

Photographic methods of changing contrasts. Objects or parts of objects can be distinguished among surrounding objects or parts only when they stand out, i.e., contrast with them. E.F. Burinsky, a well-known Russian forensic photographer, was the first to develop methods of contrast intensification.

It was work on a task assigned Burinsky by the Russian Academy of Sciences that brought him fame. In the middle of the last century, a copper vessel with approximately 400 pieces of black parchment glued together with lead and wax seals was discovered in the Kremlin. However, for nearly fifty years no one could interpret the documents, and no chemical or other processing techniques produced any results.

In 1894, Burinsky tackled the job, and his work was crowned with success. He interpreted a major part of the documents to establish important facts of Russian history. He was successful because he intensified the contrast between the characters and their background: the eye could not perceive the difference, but a film emulsion could, albeit weakly. Burinsky put several images together, and took several pictures of every original in the same scale. Then he put transparent films together with

images so that the weak character images would coincide. The result was a combined negative with intensified character images. In those places where single pictures revealed weak images, the combined negative displayed quite distinguishable letters.

In the course of further research in the photography of forensic documents, Burinsky also developed and suggested other techniques for intensifying contrast. Two types of contrast are to be distinguished, namely brightness and colour contrast. Brightness contrast is understood to be the difference in the amount of reflected light, say, when one object is lighter and another darker, and colour contrast is the difference in the spectral composition of the reflected light.

Schlieren contrast is a variety of brightness contrast. It is obtained by lighting up uneven surfaces. For example, if a cut trace is illuminated so that the light rays are perpendicular to the trace ridges, the latter would cast shadows onto the neighbouring sites to become more distinctly visible.

Criminalists intensify a schlieren contrast to interpret a colourless pressed-in text; to establish erasures in documents, which are revealed in elevation of paper fibres; or to study microscopic relief in marks on bullets in traces of choppings, cuts, drillings, and so on. Objects are illuminated at an acute angle to the photographed surface (obliquely incident light). By changing the incidence angle, one changes the illumination of contour unevennesses and the sizes of shades cast thereby. The results of intensified schlieren contrast are first assessed visually and then the object is photographed. Further contrast intensification is achieved by using highly contrast photomaterials, both negative and positive, and also superimposing the resultant images on each other.

Colour contrast is intensified when (a) there is a need to distinguish in a picture objects of the same colour but with different tones; (b) objects differ in colour but the difference is not visible in a picture taken by conventional photography; and (c) the colour of one object renders it impossible to distinguish the image of another.

By intensifying colour contrast, criminalists may reveal additional inscriptions and corrections in documents, crossed out or smeared texts, blood stains and traces from a close shot that are invisible in normal conditions.

Colour contrast is intensified by using light filters*, which make it possible to photograph an image obtained in a definite spectrum range, e.g., in the red-ray band.

There is a general rule for selecting light filters in every concrete case: a light filter of the same colour as the main object (a spot to be revealed, dye streaks on document) and a light filter complementary** to the background colour are used to intensify colour contrast. In the first case, the object that interests the investigator is made lighter against a dark background, and in the second the other way round. In both cases, however, the main objective in intensifying the contrast between the object and background will have been achieved.

Light filters are selected either experimentally or by theoretical calculations. In the former case, the investigator consecutively makes several picture samples, combining different light filters*** with photomaterials varying in spectral (colour) sensitivity. In theoretical calculations, spectrophotometers are used to measure in different spectral bands the reflectance of the objects to be distinguished by intensifying different contrasts. Taking into account the obtained data on reflectance factors, one selects the light filter that allows for taking pictures in the optimal spectral range.

To show colour distinctions, criminalists also use colour photography. Colour pictures afford a clearer idea of the images than black-and-white photographs. In fact, traces of erasures, corrections in document texts, and so on can be clearly distinguished in colour pictures.

Photography in invisible rays includes taking pictures in infrared, ultraviolet, X-rays, etc., and makes it possible to reveal and

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* A coloured medium (most often glass) that selectively passes or selectively absorbs rays of definite wave length are called light filters.

** Complementary colours are those that produce the colour white when mixed with basic colours, viz. blue, green and red. For each basic colour, the sum of two other basic colours would be complementary: light blue (blue + green) for red; yelow (green + red) for blue; and purple (blue + red) for green.

*** The glass light filters used today in Soviet criminalistics (cited in the so-called colour glass catalogues of the USSR) number about 120 and they are distributed more or less evenly over the spectral ranges.

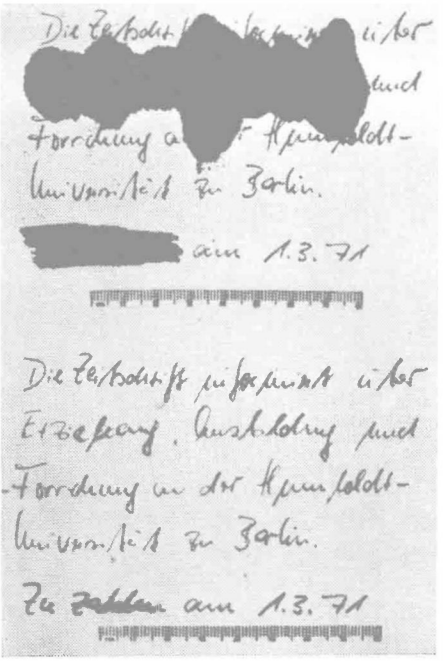

Fig. 33. Photography in infrared rays *Above:* ink-stained text photographed in ordinary rays; *below*—in infrared rays.

register in criminalistic objects details and marks that cannot be observed in invisible light.

Photography in invisible infrared rays can be achieved with conventional cameras and lenses. The object is illuminated with incadescent lamps (300-500 W), whose radiation spectrum has many infrared rays. A compact red or infrared light filter is placed in front of the lens to pass only infrared rays reflected from the object and give an image in that range. Pictures are taken using special infrachromatic materials sensitive to invisible infrared rays. There are also techniques of photographing the infrared luminescence of objects, i.e., luminescence caused by visible light but occurring in the infrared range.

Infrared rays are used to take pictures of documents either to reveal forgeries (see Figs. 35-37) or interpret deleted or smeared texts (see Fig. 33); also, entrance holes from firearm

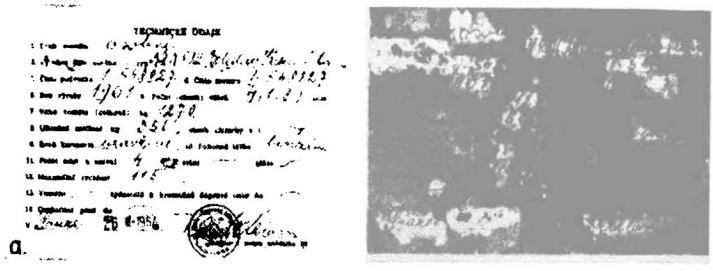

Fig. 34. Picture of the luminescence of an etched document. *Left:* illuminated with visible light; *right:* illuminated with ultraviolet rays.

shots are photographed in infrared rays to reveal traces of short-range shots.

Yet another method of taking pictures in invisible rays involves ultraviolet rays, including photography in reflected ultraviolet rays and that of luminescence induced by ultraviolet rays.

When taking pictures in reflected ultraviolet rays, one uses special quartz lenses which, unlike conventional glass lenses, pass ultraviolet rays. An ultraviolet light filter which passes rays of a definite spectral range is placed in front of the quartz lens.

In photographing luminescence, ultraviolet rays serve as the excitation source. In illuminating an object in the dark with mercury-quartz bulbs, one obtains a luminescence image in visible light. Hence, such luminescence is photographed with conventional cameras using conventional (glass) lenses. Luminescence pictures are taken to reveal etching traces (see Fig. 34); to restore etched and washed-off texts; to read secret writing; to reveal traces of substances on clothes; and so on.

Pictures are taken in X-rays (radiography) using an X-ray apparatus. The object is placed under the X-ray radiation source (X-ray tube) on a cassette with special X-ray film. When passing through the object, the X-rays expose a concealed image on the film, which is subsequently developed by conventional techniques.

Photography in beta- and gamma-rays is performed in the same manner, and a suitable radioactive substance serves as the radiation source.

Fig. 35. Picture of a genuine $2.00 banknote.

Fig. 36. Picture of a fake banknote in ordinary rays.

Criminalists use X-ray and gammagraphic methods to examine firearms, munitions, locks and other metal objects. The beta-ray method is used chiefly to examine documents.

* * *

Fig. 37. Same banknote photographed in infrared rays.

The use of any kind of photography, filming and video recording must always be registered in the record of a given investigatory action. The investigator notes the photographed objects, the technical means used, the conditions in which pictures were taken and the number of pictures.

If photography was used during expert examination, the expert concerned must record all pertinent results.

Chapter 8

FROM BRAND TO FINGERPRINT

1. CRIMINAL REGISTRATION OR CRIMINALISTIC FOLLOW-UP

Criminal registration represents a follow-up of objects of criminalistic significance: certain groups of convicts, missing persons and unidentified dead bodies; stolen articles, and items discovered at scenes of crimes. The purpose of criminal registration is to provide individual or group identification of a given object to thereby help investigate and disclose a crime or prevent that crime.

In the USSR, the principal object of criminal registration is a convicted criminal who has begun to serve his sentence.

Criminal registration methods have not always been what they are today. In the Middle Ages, maiming penalties were used instead of registration to simultaneously punish and mark the convict by chopping off his hand, nose, or ear, or by cutting out his tongue. The so-called Carolingian Code of Charles V, for instance, mentions both "cutting off ears" and "chopping off the nose". In Russia, under the imperial decree of January 15, 1724, hard-labour convicts had their nostrils torn out to make would-be escapees readily identifiable.

Branding, first mentioned in ancient Greek literature, was also later used in medieval Europe. In Russia, this barbaric method was legalised by the tsar's ukaz of 1691. Brands were made with a red hot iron and by tattoing such signs as "B" (standing for the first Cyrillic letter in the Russian word *Вор*—thief), "СК" (the abbreviation for the Russian *ссыльный каторжанин*—exiled hard-labour convict), "У" (the first letter of the Russian *Убийца*—murderer), and so on. In Austria, they branded convicts' backs with letters that indicated the crime and locality where it was committed, and in France there was a system of symbols designating the galleys, hard labour and other

punishments to which the convict was sentenced as well as the nature of the offence.

Branding was abolished in different countries at different times. In France and Russia, this occurred in 1732 and 1863, and in China as late as in 1905. In Thailand, convicts continued to be tattooed up till 1940.

Branding was replaced by special records for registering information on convicts. These records contained only the criminals' features, which were described in such an arbitrary and unsystematic way as to make subsequent identification virtually impossible. Another unique form of registration were "identification parades". Police officials from various localities or local detectives would go to a prison. The inmates were lined up before them so they could identify recidivists who had assumed false names and, at the same time, remember as many faces as possible for the future.

With the invention and increasing use of photography for identifying criminals, special albums with criminals' pictures, initially arranged in alphabetical order came into use. In 1874, such an album was introduced at the Paris prefecture, and in 1876 at the Berlin Police Department. By 1910, the Berlin album consisted of fifty-three volumes containing over 370,000 pictures and included sections on different categories of criminals.

But photograph albums still left much to be desired. When a criminal took an alias, it presented real problems in looking for his picture.

The introduction of anthropometry may be regarded as the beginning of a scientifically-grounded system of criminal registration. Anthropometry was initiated by Alphonse Bertillon, a Paris Prefecture official who used the statistical studies of Adolphe Quételet, a Belgian astronomer and statistician. Quételet proved there could be no two persons with identical dimensions of all body parts, and the probability of revealing two individuals of the same height was 1:4.

Bertillon further developed Quételet's concepts to indicate that if, in addition to height, one took yet another measurement say, the torso length, the probability of coincidence would be reduced to 1:16, and with eleven measurements to 1:4191304. With fourteen measurements, the ratio would be 1:286435456.

The choice of dimensions is large, since, besides height, one could also measure skull length and width, length of various digits, forearms, feet, etc.

Bertillon also suggested a system for classifying measurements index cards so that each file section would contain not more than twenty cards, thus making information quickly available.

In 1888, Bertillonage—the anthropometric method of criminal registration—was officially recognised in France, and then in other countries as well. In Russia, the first anthropometric agency was opened in 1890. Subsequently, Bertillon supplemented his registration cards with identification photographs. Besides full-face pictures, he began taking profile photographs, taking special care to photograph the criminal's ears. Naturally, he was not guided by widespread claims at that time that a murderer's ear lobules would be thicker than those of document forgers or embezzlers. He merely insisted that of all parts of the human body, of all human features, the ear was the most difficult to measure and easiest to remember. In fact, already during the first ten years Bertillon's photograph collection helped catch and identify 3,500 criminals.

But long before Bertillon obtained permission to perform his experiments, India became the scene of events which later became "fatal" to the anthropometric method. In 1853, a new police official named William J. Herschel (1833-1917) arrived in Khugli (Bengal). He was destined to become the first European to use fingerprints to identify criminals.

2. DACTYLOSCOPY: A METHOD OF CRIMINAL REGISTRATION

Dactyloscopy (the study of fingerprints and their use in fighting crime) is much older than criminalistics itself, and goes way back to ancient times. In Assyria, Babylon, Ancient Egypt, China and Japan, thumb prints were used to identify people when concluding various agreements and deals.

In 1686, Professor Marcello Malpighi of Bologna University (Italy) took an interest in finger patterns. In his works, he mentioned "various lines and patterns" on fingertips, but hesitated to comment on their origin and purpose. The first scientific treatise on the subject was written in 1823 by Johann Purkinje

from Breslau University (Germany), who subdivided all finger patterns into nine types to advance the hypothesis that patterns are associated with touch; however, he did not stop to think whether they reflected human individuality.

Today, it is hard to judge whether Herschel knew of the ancient practice of using fingerprints or himself arrived at the conclusion that they could help to identify people. Calcutta, where he served, had a large Chinese colony and, possibly, having learned their customs, Herschel in 1858 started his dactyloscopic experiments, subsequently proposing the method for identifying individuals.

Approximately at the same time and independently of Herschel, Henry Faulds (1843-1930), assigned to the British Medical Mission in Japan, also turned his attention to the phenomenon of fingerprints. In 1886, Faulds returned to Britain and for two years tried to convince Scotland Yard to accept his method but to no avail.

In 1888, the London Royal Institute invited the famed British anthropologist Francis Galton (1822-1911) to read a lecture on measuring body parts by Bertillon's method, and Galton took the opportunity to acquaint the audience with other identificational methods, too, including dactyloscopy.

In fact, his lecture at the Royal Institute prompted him to start serious research in dactyloscopy, first under a purely anthropological angle. As a result of numerous experiments and observations, he arrived at conclusions that had decisive significance in consolidating the dactyloscopic method, namely that the papillary pattern remains unchanged throughout an individual's lifetime (here Galton confirmed Herschel's view but somehow failed to quote him); that the papillary pattern is unique and strictly individual; and that, despite their individuality, papillary patterns are classifiable. Yet, Galton's attempts to develop his own classification proved unsuccessful.

Dactyloscopy could not become widespread because of the absence of a simple and reliable classification system of papillary patterns. The first step in this direction was made by Juan Vucetich (1858-1925), an Argentine police officer of Dalmatian origin, who by 1891 had developed a ten-digit system for classifying fingerprints, which he subsequently continued to improve and streamline.

Vucetich's classification system was then unknown in Europe, which attributed the honour of solving the task to Edward R. Henry, Inspector-General of Bengal's Police Force, later Commissioner of the London Metropolitan Police.

Edward Henry (1859-1931) first used the anthropometric method. However, after reading Galton's works, he was carried away by the idea of dactyloscopy and became its ardent supporter. By 1900, he had completed a classification of papillary patterns which proved so successful that it is used in many countries today, either in its original form or as a basis for other systems.

In 1902, dactyloscopy was introduced in Hungary and Austria, and in 1903 in Germany. In 1906, it became established practice in all Russian prisons, but the French police continued to adhere to anthropometry. Only in 1911, after the sensational case when the famous Mona Lisa, Leonardo da Vinci's masterpiece, was stolen from the Louvre, the French began to doubt the credibility of Bertillonage. In some other country where the police used the dactyloscopic method, the theft might have been exposed in several hours, but in France, it remained an unravelled mystery for over two years.

In pre-revolutionary Russia, they used the Galton-Henry system of ten-digit registration. In the USSR, the system of criminal dactyloscopic registration was modified by P.S. Semenovsky (1883-1959), who, among other things, developed a method for finding index cards when fingermarks of less than ten digits were available at the site of a crime.

Many years have elapsed since the service of criminal dactyloscopic registration was organised. Over the years, not only ten-digit dactyloscopic card files, but five- and one-digit (monodactyloscopic) files have become widespread all over the country. This has made it possible to check single fingermarks discovered at scenes of crimes or accidents. To look for dactyloscopic information, registration card storages have begun to use automatic devices enabling them to find coded pattern images. Holographic fingerprint images have superseded coded images. In fact, holograms make it possible to reproduce on a small plate a large number of fingerprints to compare them directly with the trace images.

3. CRIMINAL REGISTRATION SYSTEMS

A criminal registration system is understood to be a definite order of reproducing, storing (distributing established evidence) and searching for data at inquiries of investigation and forensic bodies.

Follow-up data is systematised on the basis of classifying registration objects and their identification marks. For humans such marks would be biographical particulars; external marks and features characterising individual habits, e.g., the way in which a crime was committed. For other material objects, they would be external marks, common and specific and signs of artificial individualisation (numbers, series, etc.).

The features of criminal registration objects are registered descriptively (written statements on registration cards and/or in logs); photographically (pictures on cards and/or in albums); and dactyloscopically (fingerprints on cards). Quite often combined methods are also used.

Registration of criminals. Most often, this is done dactyloscopically by reproducing the fingerprints of both hands on the card, five right-hand digits above, and five left-hand digits below (see Fig. 38). Control right- and left-hand fingerprints are reproduced below. The cards are filed and searched for using basic and supplementary dactyloscopic formulae. The basic formula is based on registering only helical patterns. Ten fingerprints are grouped in on the card into five pairs, each of which would be conventionally numbered to decrease in geometric progression (16-8-4-2-1). These numbers designate only helical patterns. The result is put down in the form of a fraction, the numerator denoting the numerical designations of helical patterns on the even digits, and the denominator those on the odd digits. If a finger has no helical pattern, the investigator writes down 'O' (zero). The obtained figures are added together, and then 1 is added to the sum. In the total absence of helical patterns, the fraction would be $\frac{1}{1}$; and in their presence on all the digits $\frac{32}{32}$. The basic formula for the picture on the dactyloscopic chart would be $\frac{9}{5}$.

In checking an individual by the card file, the investigator first

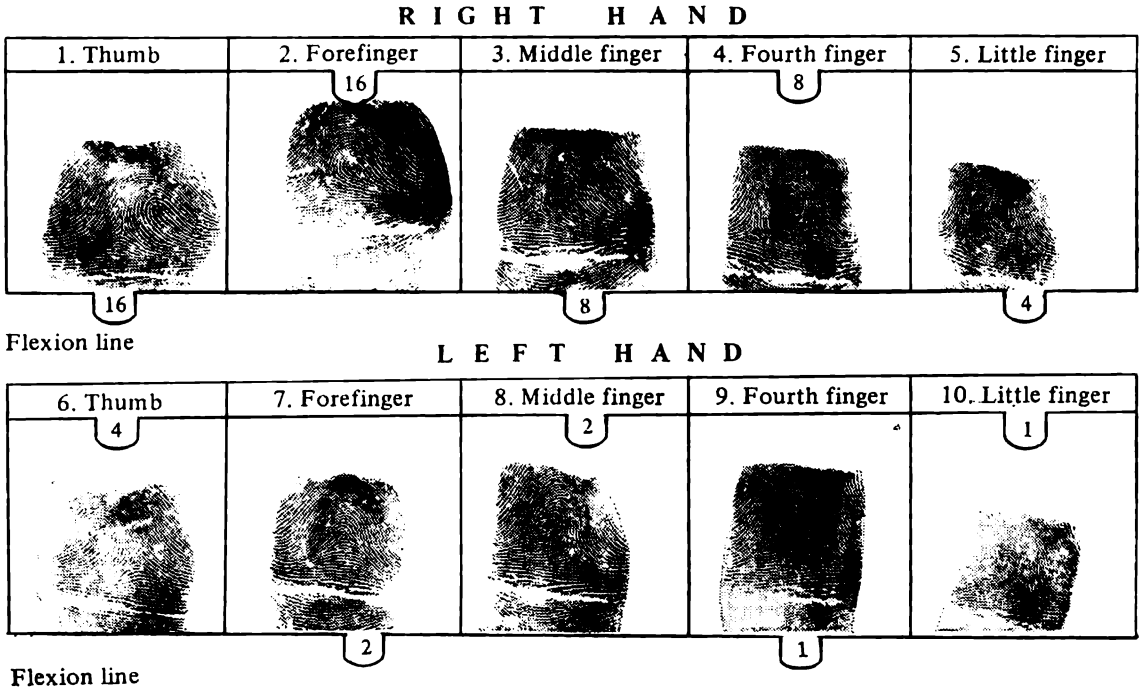

Fig. 38. Upper portion of a dactyloscopic chart.

finds a group of cards with the same formula and then finds the needed card by comparing the fingerprint on the card with the corresponding fingerprint of the individual being checked.

In addition to fingerprints, the person's last name, name, patronymic, year and place of birth, nationality and the crime he or she was convicted of would be entered as registration data.

Registration of missing individuals and unidentified dead bodies. The police begin to look for a missing person (in hospitals, morgues and police stations) at the request of his relatives or other individuals. The responsible official enters into a card file the individual's biographical particulars, marks established by the word-picture method, photographs, description of clothes and missing personal belongings and information concerning where he was seen last.

Unidentified dead bodies are registered to help identify them. The registration card includes a description of marks, clothes and items found together with the body, photographs of the head from five angles, and fingerprints.

Cards of missing persons are compared with those of unidentified dead bodies.

Stolen items are registered before the crime has been solved. This is done to help in the search for stolen articles with distinctive marks (usually some number) by which the item could be found and identified. The police register stolen motorcars, cameras, typewriters, watches, hunting rifles, valuables, museum and art pieces, clothes, and other items.

Information on these objects (name and detailed description of item, trademark, serial number, year of manufacture, etc.) is recorded on special cards along with the victim's name, address, etc.

Stolen and/or missing animals are registered in a similar way, indicating their species and breed, colour, sex, age, and common and specific marks.

The registration of firearms includes stolen, lost, withdrawn, surrendered and found threaded weapons.

Bullets and cartridges removed from the site of an undisclosed case are stored so that the investigator may check whether bullets and cartridges found at different sites of events were fired from the same weapon, and whether or not that weapon is the

gun being checked, i.e., the one the investigator obtained after a given crime was perpetrated.

Registration of unsolved crimes according to the way they were committed.

This involves a card file for tracking down an individual who has committed several crimes in the same manner. The card would indicate the class of crime (pocket theft, rape, etc.); the manner, time and place of the offence; and other information.

Such cards make it possible to check whether or not the criminal was registered before. This kind of registration facilitates the hunt for criminals.

Chapter 9

CRIMINALISTIC TACTICS

1. WHAT IS MEANT BY CRIMINALISTIC TACTICS

As a section of Soviet criminalistics, criminalistic tactics, first of all, involves the doctrine on crime versions and investigation planning. Tactics also includes the general principles of interaction among investigators, operatives, other branches of the USSR Ministry of the Interior (the patrol-and-sentry service, State Automobile Inspection, etc.), criminalists, forensic medics, chemists, biologists, etc., and the public. Basically, tactics constitute techniques for specific investigatory actions. These are outlined in the chapters that follow.

Tactical techniques are numerous and diverse, and all of them without exception correspond to principles of legality, their use being possible only if the requirements of Soviet law and ethics are not breached. In addition, tactical techniques must be scientifically based and produce reliable results.

In an overwhelming number of cases, the investigator is free to choose the tactical techniques he wishes to use. Yet, in some cases, the law prescribes or prohibits some specific tactical technique. For example, the law demands that a person or item be submitted for identification among a group of similar objects. In this case, the investigator would have no right to choose a tactical technique and must fulfil the requirements of the law.

The advice that criminalistics provides for choosing a given tactical technique is called a criminalistic recommendation. This helps the investigator to select precisely those techniques that would be most suitable for a given case.

2. INQUIRER'S VERSION

The collection, study and use of evidence in investigating criminal cases is designed to establish the truth. However, this would

not be feasible without accumulating evidence that reveals the essence of a crime in all its details. On the other hand, accumulation of the factual material *per se* would be unfeasible without hypothetically explaining the causes that gave rise to that evidence. The hypothesis for a given fact or group of facts that have significance in the case and explain their origin, correlation, contents and conclusive significance is called *a version.*

In logical terms, a version represents a variety of a hypothesis which, logically, is understood to be an assumption explaining the origin, existence or essence of the causes of a given phenomenon. There are scientific, specific and working hypotheses.

A version represents a type of a particular hypothesis. In explaining the essence and origin of specific facts, it is strictly individual in nature, with significance only for a given concrete fact. At the same time, the fact that certain versions are short-lived by no means indicates that they have a temporary nature, for they definitively explain a given fact at all times.

As a hypothetical explanation of a given fact, a version cannot be identified with any hypothesis arising in the course of a criminal investigation. A version is, in the first place, a well-grounded hypothesis.

As a probable hypothesis, a version essentially indicates that the explanation of a relevant fact or group of facts might be true, and that it might be possible to turn that hypothesis into authentic knowledge.

A version is a substantiated hypothesis about a fact or phenomenon relating to a given case. Hypothetical explanations of facts not related to a given crime cannot be regarded as versions.

Hypotheses about facts significant for a given case may be stated by witnesses, victims, the accused and other persons. However, these hypotheses cannot be regarded as versions till they are accepted for verification by the investigator, i.e., by the official whom the law has entrusted with the right and who accepts the responsibility of this verification. Hypotheses stated by witnesses, accused individuals and other persons may become the basis of versions, but they themselves would not be versions. Hence, it would be incorrect to speak of a "witness's version" or a "version of the accused".

Finally, a version is not only a well-grounded, but necessary explanation of some fact or phenomenon, i.e., a hypothesis that

must be verified to establish the truth. The necessity of a version is closely connected with its reality: if a given hypothesis is likely, its verification is essential, for this would guarantee a complete and impartial investigation.

With regard to the scope of encompassed facts, investigatory versions are subdivided into the general and specific. A general version explains an event as a whole, i.e., the entire subject to be proved. A specific version relates to an individual fact, i.e., to some particular aspect of an event.

Proceeding from the essence of a version, the investigator determines the further direction of the investigation. Versions orient him to where and what proof to seek; what to pay attention to in investigating the evidence; and what to consider most substantial for establishing the truth when assessing this evidence.

Initial evidence for constructing versions is based on proved facts; operatives' information obtained from sources unrelated to the proceedings; press and other mass media reports; and even rumours. The process of construing a version begins from an analysis of initial data.

Edgar Allan Poe, one of the founders of the detective genre in literature, first sang a panegyric to man's analytical abilities before acquainting the reader with Auguste Dupin, his amateur detective hero in *The Murders in the Rue Morgue*. Poe wrote: "The mental features discoursed of as the analytical are, in themselves, but little susceptible of analysis. We appreciate them only in their effects. We know of them, among other things, that they are always to their possessor, when inordinately possessed, a source of the liveliest enjoyment. As the strong man exults in his physical ability, delighting in such exercises as call his muscles into action, so glories the analyst in that moral activity which *disentangles*. He derives pleasure from even the most trivial occupations bringing his talent into play. He is fond of enigmas, of conundrums, hieroglyphics; exhibiting in his solutions of each a degree of *acumen* which appears to the ordinary apprehension praeternatural. His results, brought about by the very soul and essence of method, have, in truth, the whole air of intuition."*

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* Edgar Allan Poe, "The Murders in the Rue Morgue", *The Fall of the House of Usher and Other Tales,* the New American Library of World Literature, Inc., New York, 1960, p. 49.

Indeed, Dupin does show such miracles in disentangling the mystery of the murders.

Sir Arthur Conan Doyle echoes the analyst Poe through Sherlock Holmes: "It is of the highest importance in the art of detection to be able to recognise, out of a number of facts, which are incidental and which vital. Otherwise your energy and attention must be dissipated instead of being concentrated."* Herein lies the essence of the great detective's celebrated "deductive method", later repeatedly praised not only by students of Conan Doyle's writings, but by numerous criminalists who granted him a patent on his invention.

But despite all our great respect for Sherlock Holmes and his creator, the deductive method actually came into existence together with *homo sapiens*, i.e., long before Conan Doyle created the ingenious Holmes.

As a process of cognising the truth, no matter when and how the investigation is conducted, any investigatory act invariably employs such methods of logical thinking as analysis, synthesis, deduction, induction, analogy, etc.

Curiously enough, there actually lived a man with such amazing detective abilities, the prototype of the celebrated Sherlock Holmes. This was Joseph Bell, an outstanding surgeon and lecturer of Edinburgh University, which Conan Doyle used to attend.

In simplified form, an investigator's mental activity in investigating a crime would be as follows. After inspecting the site of the event, questioning the victim and witnesses and performing other urgent actions, i.e., after having collected all initial information, the investigator must come up with a possible version of the crime. The process of constructing a possible version is inductive. However, to advance a version does not yet mean to uncover a crime. A version only determines the investigation trend, which actually only begins with the former. And this is where deduction comes into play: from the version, the investigator must deduce all the consequences, i.e., visualise what facts can or cannot exist if the version is correct. He must also decide whether his hypothesis of the event corresponds to reality. For

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* Sir Arthur Conan Doyle, "The Reigate Squires", *The Adventures of Sherlock Holmes*, the Heritage Press, New York, 1950, p. 652.

example, if the discovery of a body leads to a version of premeditated murder from mercenary motives, the factors involved would be: (a) marks of violent death on the body; (b) involvement of some one who profited from the victim's death; (c) circumstances that prevented that person from receiving the profit during the victim's lifetime; and so on.

In investigating the crime, i.e., during inspections, interrogations and/or searches, the investigator tries to verify whether such circumstances existed or not. This is known as the version verification stage. If all the circumstances fit, the version is accepted as true; if not, the investigator must start constructing a new version followed again by deduction. This cycle is repeated until a positive result is obtained. Thus, from a logical viewpoint, an investigation represents a combination of inductive and deductive processes, naturally also concomitant with analysis, synthesis and other logical procedures.

Therefore, the logical scheme in any investigation process is to obtain initial information, construct a hypothesis version, deduct consequences from that version, verify those consequences, and evaluate the version. In the course of verification, unconfirmed versions are excluded until, finally, the one that corresponds to the truth remains, and this would already be proven reality, not an assumed version. In fact, both Auguste Dupin and Sherlock Holmes acted exactly in this manner. Just recall Holmes' words: "It is an old maxim of mine that when you have excluded the impossible, whatever remains, however improbable, must be the truth."*

Naturally, when Holmes speaks of an "improbable" truth, he only emphasises that the event was exceptional, not supernatural, and that is where the reality of a version is revealed, i.e., in the possibility to explain an event on the basis of existing reality. For example, if two hours before a crime, somebody was ten thousand kilometres away, a version implying his direct involvement would not be plausible, since existing transportation renders it impossible to cover the distance in such a short time.

The investigator is not always in possession of evidence sufficient for logical analysis and allowing him to advance a cor-

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* Sir Arthur Conan Doyle. "The Beryl Coronet", *The Adventures of Sherlock Holmes*, p. 487.

rect version on the basis of consistent inferences. Yet, an experienced investigator sometimes uses negligible marks, insignificant details of a given event, and nuances in the suspect's behaviour to make correct guesses, subsequently confirmed by collected evidence. In this case, we speak of investigative intuition, when a truth not inferred logically from other truths is conceived directly by the mind.

In fact, there is nothing mysterious or supernatural in intuition. The mental process is often elusive. Normally, it represents a totality of various judgements, some of which have developed logical form, some are accepted in reduced form, and others are totally dismissed as already known, verified by experience proven by practice or established by some branch of knowledge. As a result, an obtained inference seems isolated from the initial evidence as pure and totally ungrounded guesswork. Yet, the ability to intuitively guess the truth is backed by experience and knowledge, which, in fact, makes it possible to suddenly find the right solution. Nonetheless, it remains only a guess subject to verification in the course of the investigation. This guess becomes true knowledge only when corroborated by evidence.

Konstantin Paustovsky, a well-known Soviet writer, gave a very accurate definition of intuition in his *Notes on Writers' Work* by saying: "To my mind, intuition is the ability to restore the whole picture by some individual part, some detail, some single property." This ability, however, has nothing in common with extrasensory qualities that most people lack.

Intuition makes it possible to select from numerous versions those which the investigator believes most important to verify, thus often lessening the investigation time and leading to the discovery of significant details initially unrealised by him, which, when verified, could decisively affect the investigation results.

In Brno, Czechoslovakia, an investigator received word that a woman called Ya. was drowned in her bathtub. The documents he received included a report, a brief Inquest Certificate, and a Statement of Examination. This is what they reported: "On June 4, 1958, an ambulance physician was summoned to Ya.'s flat. He arrived there at 01.15 a.m., and stated that the woman had been dead for approximately three hours. A local public security officer and physician were then called. They examined the body, questioned the victim's husband and drew

up a record of evidence, which noted that no traces of violence were revealed on the body except for a small scratch on the left ankle. The two officials suggested that a forensic medical examination be performed.

The Inquest Certificate noted that, according to her husband, Ya. had lengthily been suffering from epileptic fits, usually accompanied by loss of consciousness. He said his wife had gone into the bathroom at about 10.00 p.m., and that he felt very tired, went to bed and soon fell asleep. He woke up near midnight and noticed there was a light in the bathroom. He went inside to find his wife lying in the tub, her head completely under water and left hand holding the edge. He then woke up his elder son, and the two moved the woman onto the kitchen floor and tried to revive her, but to no avail. So the husband called the ambulance, and the doctor pronounced her dead.

All seemed clear, and the only thing needed to close the case was to question the victim's husband, who that night had allegedly been sleeping in the same room with his small children. He was summoned for interrogation, and repeated what he said before.

But at the end of the interrogation, it suddenly "dawned" on the investigator that it was the husband who had murdered Ya. Yet, if one looks into the evidence which at that moment was available to the investigator, one would realise that the latter's guess was not a groundless supernatural "revelation". But one based on circumstances which he had simply had no time to substantiate logically. To begin with, he was well aware of similar cases, which he had studied in criminalistic literature. Secondly, throughout the interrogation, the husband did his best to draw the investigator's attention to the fact that his wife had been suffering from epilepsy, and then, for no reason whatsoever, repeatedly said that, in trying to revive her, he massaged especially her neck.

An autopsy revealed that the investigator's intuitive guess was quite credible, there were numerous bruises on the head and soft tissues; on the throat, chest and upper and lower extremities; and under the nose. According to forensic medical experts, these bruises could not result from massage; nor could Ya. have inflicted them herself during an epileptic attack. The husband was exposed and pleaded guilty to murder. And it was intuition that

helped the investigator establish the truth. But generally speaking, the investigator must size up his impressions and determine the marks with which the evidence either convinces him or instills doubts; then, having found new evidence and having made sure it is true, he must determine the correct and incorrect factors suggested to him by intuition.

To make our point, we cite heroes from detective novels. Sherlock Holmes: "You know my methods in such cases, Watson: I put myself in the man's place, and having first gauged his intelligence, I try to imagine how I should myself have proceeded under the same circumstances."*

Father Brown: "I had planned out each of the crimes very carefully... I had thought out exactly how a thing like that could be done, and in what style or state of mind a man could really do it. And when I was quite sure that I felt exactly like the murderer myself, of course I knew who he was."**

Yet, possibly these excerpts merely reflect a literary device that emphasises the acuity of the hero's perception? Perhaps this should not be taken seriously? No, the idea of the investigator's "reincarnation" deserves very close attention. This is what V.I. Gromov, one of the first Soviet students of criminalistics, wrote in this connection: "One must put himself in the place of the man being sought; one must take into account his mentality, profession, life style, character and habits, and ask oneself: where would the investigator himself choose or try to hide the sought item if he himself lived in the same situation and conditions as the person being sought, had the same mental abilities, professional habits and skills as the latter."

In present-day criminalistics, the idea of the investigator's "reincarnation" has come to be used in so-called reflexion, or the theory of reflexive games, essentially designed to penetrate into the partner's thinking and to "outdo" him, either by foreseeing his decision or by inducing him to make one that would be desirable for oneself.

Psychologists illustrate the process of reflexive thinking in how

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* A.C. Doyle, "The Muscrave Ritual", *The Adventures of Sherlock Holmes*, p. 634.

** G.K. Chesterton, *The Secret of Father Brown*, Penguin Books, Harmondsworth, 1978, p. 11.

an investigator hunts a criminal who has escaped from the scene of a crime. In all probability, he has taken one of two routes: A, suitable for traffic but more crowded and hazardous, and B, worse for traffic but safer. Again, the pursued would argue: "B is better than A; so I choose B." The investigator would reconstruct his trend of thought to conclude: "The criminal knows route B suits him better than A, and so he chooses B; that means I must pursue him there".

But then the criminal would argue: "The investigator thinks that I, knowing the advantages of route B, will take it and pursue me there. So I am going to take A."

Now, if the investigator's reflexion is better than the criminal's, he will foresee the latter's choice and take route A to seize him there. Better reflexion allows the investigator not only to foresee his adversary's behaviour, but to duly plan the subsequent investigation.

The soundness of a version depends on how thoroughly the initial evidence has been analysed. There have been many examples where thoughtful analysis of initial information permits the investigator to instantly advance a version that will already be confirmed in the course of investigation. Sometimes, a timely version of a crime is especially important.

The militia received a statement from Fedina, a shop cashier. The woman wrote that one night, when she was alone in her flat, two strangers came. They said they were militia officials and produced a forged search warrant. They then took a gold bracelet and disappeared. One month later, they repeated the raid, and Fedina claimed this time they raped her.

Indeed, when her neighbour came home, she found the front door open and Fedina's room in such disorder as to indicate a robbery and rape. Fedina herself was lying naked in bed with hands and legs bound. The neighbour began to scream; other neighbours quickly came and untied Fedina. The victim told an operative that she had locked the door as usual and retired. At about 2.00 a.m. a knock at the door woke her up, but she would not open it. Then someone strongly jerked the door and forced it open. The same two strangers broke into the flat. They stole her money, tied her up, then raped her.

It was later discovered that Fedina had quarrelled with her husband, who had moved in with a friend. She claimed he had

repeatedly threatened her with violence for having ruined his life, and kept saying that if not he himself, his friends would take vengeance for him. She alleged that after her husband had moved from the flat some strangers began calling her on the phone and threatening her with all kinds of abuse. She believed that all that had happened was their responsibility.

However, a subsequent investigation established that Fedina never had a gold bracelet. Moreover, the room where she lived was her husband's, and she feared she might lose it after they were divorced. The investigator also learned she was trying to legalise her right to the room, and had even made inquiries whether she would get it if her husband was arrested for some offence. Pressured by all these clues, Fedina pleaded guilty to passing false information and feigning robbery and rape. So the investigator's version was fully corroborated.

A version may be verified in several stages. The first is to infer all the possible consequences, and the second—to determine what investigatory actions must be undertaken and in what sequence to establish whether any consequences do or do not exist. In fact, this constitutes the investigation planning stage.

3. PLANNING CRIME INVESTIGATIONS

The process of investigation represents a complex and varied activity, a variety of actions and measures. Only clear and comprehensive planning makes it possible to limit this activity, to subordinate it to definite objectives and to ensure a complete and timely investigation.

Investigation planning aims (sometimes called planning tasks) include: determining the direction and essence of the investigator's activity at all the stages of the work; making it purposeful, complete, impartial, comprehensive, quick and effective in applying various evidence handling techniques.

It is readily apparent that planning objectives are subordinate to implementing the principles of preliminary investigation specifically expressed in planning.

Investigation planning principles. The principles or guiding tenets of investigation planning are essentially designed to make it individual, dynamic and logical.

The first principle signifies that the investigation plan must reflect the specifics of a concrete case, i.e., take into account the peculiarities and circumstances of the crime under investigation. Again, in planning an investigation, a routine approach must be completely ruled out.

The principle of dynamic activity reflects the need for continuous planning. A plan is not a dogma, but a guide to action, and it must reflect new evidence and versions that could change the investigation. An investigation plan plays its organising and guiding role only if it is continuously revised in line with newly arising circumstances.

The principle of logic is reflected in the need to take into consideration the actual possibilities of the investigation and to see that the versions accepted by the investigator for verification, planned actions and deadlines are realistic.

Investigation planning conditions. Planning is possible under the following major conditions:

(a) availability of at least minimal initial information; of course, realistic planning would be out of the question if there were a total absence of information on the event to be investigated. The individual character of planning and the follow-up of the specifics of a given case depend on the scope of information available for planning;

(b) assessment of the situation in which the investigation is being conducted, and forecasting its future changes as a result of actions being planned. Planning always stems from an assessment of the existing investigatory situation and always takes into account possible future changes, both those resulting from actions undertaken under the investigation plan and those of people interested in concealing the truth. In fact, it is the constant observance of this condition in the course of planning that ensures its dynamic character;

(c) consideration for realistic possibilities, ways and means of achieving a planned objective. Without this, planning would be unfeasible. If the investigator overestimates these possibilities, the plan may prove unrealistic, since the planned actions would not produce the anticipated effect; if he underestimates the possibilities, the plan would come to include superfluous actions which could entail unjustified delay of the investigation and useless expenditure of efforts and funds.

Investigation planning stages. The process of investigation is normally subdivided into two stages: (a) the stage of initial actions and measures, and (b) the stage of subsequent investigatory actions and measures. These differ in the scope of tasks to be resolved and in organisational forms, which in turn determine the amount and quality of the needed efforts and funds.

The tasks to be solved in the initial stage of investigation are:

(a) to clarify the circumstances of the event to be investigated; to size up the facts to be investigated; and to obtain initial evidence for extensive investigation planning;

(b) to collect and establish all possible evidence which may be lost with time;

(c) to identify and track down the criminal; and

(d) to ensure compensation of material damage inflicted by the offence.

To begin with, the investigator plans such actions, which, if delayed, might make them either little effective or even unfeasible. For example, inspection of the scene of the crime, search, interrogation of a dying victim and so on.

He then plans actions to ensure the normal course of investigation (selection of a preventive punishment, attachment of property). This is followed by planning actions that could require considerable time, for example, expert examinations. If the investigator fails to take this into account, the investigation might become prolonged.

Among other investigatory actions, those to be planned earlier are those that will serve to verify several versions.

In the next stage, one must solve tasks connected with comprehensively proving guilt, formulating and substantiating the indictment; and minutely analysing and assessing all available evidence. In fact, these are tasks to be included in the investigation plan.

The ability to collect, assess and correlate evidence so as to form a single logical chain of events requires high skill. Only in such a system does every piece of evidence assume validity. Indeed, any investigation is a process of creating a system for establishing the truth.

The techniques of logical thinking are not only investigatory

guidelines. The investigator also uses them to assess the collected information, establish the correlations between various pieces of evidence, and specify their place within the system of relevant proofs.

Correlation between proofs could either be of a *cause-and-effect* nature or *coincidental* in space and time. But with reference to an offence under investigation, all proofs are invariably correlated by ***cause-and-effect*** factors.

A crime usually arises as a cause, and evidence as its effect. For instance, a murder would be the cause of blood-stains at a given site.

The following true example shows how important is to establish a correlation between proofs.

One night a café caught fire. The watchman noticed the blaze in time, and the firemen quickly put it out. But the investigator received all the documents only one month later, and for that reason an on-the-site inspection failed to produce any sign of arson, let alone of the fire itself. But criminal proceedings were nonetheless instituted because barmaid T. and café manager K were found short of 1,000 roubles' worth of foodstuffs.

From the documents he had received, the investigator learned the snack bar, the storeroom and the café itself were located in a wooden building. The manager and the barmaid routinely received all supplies together, although they accounted for them separately. Two days before the fire, the snack bar and storeroom were sealed for an upcoming inventory by an unexpectedly-arrived inspector. The following day they were off-duty, and that night the building caught fire.

The investigator established that business at the café was not too brisk. Also, an inspection shortly before the fire failed to reveal any excess or shortage of goods; nor was theft apparent. During the fire, some of the commodities in the snack bar were damaged, but nothing was completely destroyed.

To assess correctly all the evidence and to determine ways of further investigation, the investigator had to establish the correlation between the revealed facts. A comparison of the relatively large shortage with the café's small commodity turnover allowed him to conclude the shortage had formed over a lengthy period of time. This fact, plus the results of the last inspection, gave grounds to assume that goods had been missing already

then, but the inspector had either failed to reveal the shortage or had simply concealed it.

Thus, all these facts had a cause-and-effect correlation. The relationship between the shortage and fire remained to be determined. There were two possibilities: either the fire had resulted from arson designed to conceal the shortage, or it was not causally connected with the latter, and the two facts were coincidental.

Based on the assessment of available evidence, the investigator proposed the following correlation between the two facts: the shortage may have been the result of disguised theft, and the fire was caused by arson designed to conceal the shortage that an unexpected inspection might have disclosed.

The snack bar was inspected once again, and the firemen and watchman subjected to another interrogation. This helped to establish the initial site of the blaze, namely, a floor section near which there were no heating devices or electric wiring, which, incidentally, was found in perfectly good condition.

The snack bar window had a small hinged ventilation pane.

At the ignition site, there were large cases with cigarettes, some of which were charred. The cigarettes were included in the balance sheet immediately after the fire. During the investigation, the inspector checked the balance of tobacco products and it turned out that when the fire had started there should have been no cigarettes or certain other goods in the building.

T. and K. admitted they had been stealing for a long time and handing in falsified records to the book-keepers. When the snack bar and café were suddenly sealed, K., fearing she would be exposed, threw a burning rag soaked with kerosine into the bar through the hinged ventilation hole to cause a fire that would conceal the theft.

Thus, a version based on an analysis of correlations between different evidence was fully confirmed. In fact, without such an analysis the evidence, which at first sight appeared contradictory, would have been inexplicable.

Evidence correlated by cause-and-effect factors forms a so-called causal conclusive series.

During a quarrel, S. killed his wife with a stool. A preceding commotion caused one of the neighbours to look inside the room where he saw a woman lying on the floor. S. pushed him out

and locked the door. The neighbour's sudden appearance compelled S. to take instant action to conceal the crime: he dismembered the body and, since the neighbour was gone, took the parts in several bundles out of the house and hid them in different places around town. When dismembering the body, S. tried to act with maximum caution; still several bloodspots formed on the floor. S. had failed to wash them off, so now he began scraping them. He packed the blood-stained shavings together with the victim's left leg. The bundle was later discovered in a cesspool on a neighbouring street.

All this resulted in a causal conclusive series, namely, the murder—the commotion—the discovery by the neighbour of the victim's body—the dismemberment of the body—the blood spots—the scrape-offs from the floor—the blood-stained shavings.

A system of evidence concerning the same case may involve several causal conclusive series, not just one; and, in the final account, all of them must always be interrelated by the crime.

The connecting link in causal conclusive series may be just one bit of evidence, which is also the "crossing point" in the series.

In our example one bit of evidence in the first causal series, namely, the dismemberment of the body, initiated the second causal series. S. buried the victim's arms in a deserted spot on the outskirts of the town. The owner of a nearby house noticed that his swine kept returning to the same spot to try to dig up the ground. To see whether something had been hidden, he began digging and discovered a package with body parts. He screamed, and the neighbours rushed to the spot to start digging in other suspicious places, hoping to find the rest of the dismembered body. Finally, someone discovered another bundle with the torso.

Causal conclusive series may be compatible and incompatible. Compatibility of series would signify that either the component evidence related to different circumstances in the case, or the same evidence, being a term of two or more conclusive series, had significance in one of the series that would be compatible with its significance in other series. For example, a knife revealed at the scene of a murder would figure as material evidence in one series. Then, the first causal conclusive series would be:

First causal conclusive series

fact of revealed body	fact of death inflicted on victim by a stabbing and cutting instrument	knife revealed at scene of event...

Yet, the same material evidence could also be a term in another causal series.

Second causal conclusive series

...knife revealed at scene of crime	fingerprints on knife handle	fingerprints prebelong to N.	fact of N.'s presence at scene of crime

The significance of this evidence in the first series (knife—tool of murder) would be compatible with its significance in the second series (knife—sign of N.'s presence at the scene of murder).

However, when several causal conclusive series belong to the same circumstance but explain it in different ways, or when the significance of a piece of evidence in one series is opposite to its significance in another series, this reveals the incompatibility of causal conclusive series. In this case, one speaks of contradictions in proofs (or contradictory evidence), which, if present, indicate that the truth has not been established.

The construction of a causal conclusive series makes it possible to assess the evidence collected in a given case, to determine its significance within the system of proofs and to decide on ways for further planning the investigation.

The planning process ends with the completion of preliminary investigation, i.e., when the truth has been established and the investigator may consider his task fulfilled.

Investigation planning techniques. A written investigation plan may be drawn up based on versions or episodes of a criminal activity.

The following form may be recommended in drawing up a version-based plan:

Investigation versions	Investigatory actions and other measures	Executor	Deadline

If the criminal activity involved several episodes and several persons, the investigation plan may envisage investigatory actions for each episode, usually in chronological sequence. The form for such a plan is as follows:

Content	Circumstances to be ascertained	Investigatory and other actions	Executor	Deadline

Apart from the investigation plan for the whole criminal case, it is sometimes necessary to plan some particularly crucial or complex investigatory action. This is normally done in arbitrary form, but invariably indicates the objectives, date, place and participants in that action. The plan outlines its sequence; the tactics and evidence to be used; and the technical devices that may be needed.

Chapter 10

INSPECTING THE SCENE OF A CRIME

1. THE ABILITY TO UNCOVER A CRIME DEPENDS ON PROPER INSPECTION OF THE SCENE OF THE EVENT

The process of investigation begins with inspecting the scene of the crime. This is done to reveal traces and various other material evidence; to study and establish the situation in which a crime was perpetrated; to advance a version of the crime; and to chart ways for verifying that version.

Inspecting the scene of crime is not only a task of paramount importance but one of the initial investigatory actions. Any delay in inspection could result in the irreparable loss of evidence. In fact, frequently the first step in tracking down the suspect can only be made from the site of the event, and the quicker the better. No wonder the celebrated French criminologist Edmond Locard liked to say that the initial hours of criminal hunts were invaluable, for the time passed was tantamount to vanishing truth. Traces may disappear under the influence of precipitation, or be destroyed (unintentionally or intentionally) by strangers; also material evidence may be displaced or stolen.

In a trench not far from a large Byelorussian town, a passer-by discovered the body of a young man. Less than an hour later, a task force comprising an investigator from the local procurator's office, operatives, a forensic medic and a criminalist was already working at the scene.

An inspection of the body showed that two shots from a smooth-bore rifle had been fired, one from the front into the region of the heart, and the other from behind into the upper part of the back. Under the body, the investigators found a paper wad with "kop" inscribed with purple ink in Cyrillic, and another wad made of gray felt. Three more such wads were discovered eight metres away from the body, the edges of two of them were lined with stearine. Lying fifteen metres from the body was a wood-

en shovel. Judging by the fact that there was a hole with traces of rust in the middle of the working section, and a clearly apparent indented band passing through the hole, one could guess that the wooden board of which the shovel was made had been torn from a fence. The spade had lengthwise bulging lines, ostensibly formed by the tool with which the board was originally processed.

On a potato field very close to the body, the operatives discovered traces of digging and shoe marks belonging to the victim and another man. They also found a sack which had two black stripes in the middle and charred edges, and contained a small number of potatos.

It seemed at first that the inspection at the scene of the event had failed to produce any substantial results. But further events showed that all the revealed material evidence had been used very well.

The hunting experts to whom the investigator showed the wads surmised that the murderer had no basic skill in loading guns, since it is common knowledge that a felt wad should not be used to close shot or buckshot in a charged cartridge as it reduces shooting accuracy and prevents the charge from flying in the correct direction. Rather, the wad should be made of thin cardboard. All this showed the murderer was not a hunter.

Subsequent questioning of several inhabitants from nearby villages revealed that one of them had seen a man who that morning was cycling from the potato field toward town with a rifle behind his back. The witness described his features and clothes in detail and declared he could identify him. Based on that description, the operatives identified a certain Kozlovsky, a resident of the local settlement. It was decided to search the suspect's house and examine the fence around his holding. But when they came, Kozlovsky was out and his relatives could not say why.

During the search, they found a charged hunting cartridge, whose paper wad had "kop" inscribed in purple ink. Under the paper wad, they found a felt one coated with stearine, and under it buckshot. In the shed, they discovered a shovel made from a wooden board, seventeen charged cartridges with the same "kop" inscription (later, it turned out that Kozlovsky thought the correct spelling for the Russian "картечь" (buckshot) was

"кортечь" — (abbr. "кор"); a hunting rifle; a piece of sackcloth with burned holes; and an axe. Also, the fence lacked one board, and splinters were scattered near the shed.

Three days later, operatives found and detained Kozlovsky in one of the neighbouring settlements. He was wearing sackcloth leggings with charred edges. That was when the objects found during the inspection of the scene of the event began to "testify at the top of their voice", so to speak. It turned out that the pieces of sackcloth found in the shed and those of which Kozlovsky's leggings were made were parts of the sack discovered near the body. The splinters near the shed and the shovel found at the site of the murder were made with the same axe, the one revealed in the shed; the "kop" inscription on the wad from the scene of the murder and on the cartridge wads found during the search were written by the same person, Kozlovsky; the wads from the scene of the murder and those found during the search had fibres of similar composition; the shot and buckshot extracted from the body corresponded in chemical composition with those in Kozlovsky's cartridges; and the tracks on the potato field were left by Kozlovsky's boots.

To the very end, Kozlovsky refused to plead guilty of the murder. But the voices of all the "silent witnesses" were sufficiently loud and convincing, and the court punished him severely.

2. STEP BY STEP ON THE WAY TO SUCCESS

The term "scene of the crime" is to some extent conventional. It is used to designate both the place of the crime and the place where the consequences of criminal actions, e.g., a victim's body, weapons, things stolen during an assault, etc., may be revealed. The investigator's task is to disclose and inspect all these sites.

An investigator always tries to be first at the scene of a crime to prevent anyone from changing anything or destroying traces, even unintentionally, since any movement by a stranger could inflict irreparable damage to the subsequent investigation. Something that might appear unsubstantial to him and, therefore, unworthy to be preserved, might in reality be the clue to a crime, whereas the loss of that clue would often let the criminal go unpunished.

When a police task force arrived in a remote village in connection with a reported murder, they saw cleanly washed floors, a tidy environment, and a body lying in the next room. In this way, the victim's relatives had with naive ingenuousness prepared to welcome the "important people" from the city.

A young woman, whose husband was serving in the US Army, lived with her mother-in-law in Detroit, Michigan. The latter, a divorcée, had married again, and shortly before the murder which the story below relates, divorced her second husband, too. Every day she would go to work, leaving her daughter-in-law alone. One day she returned home to find the young woman murdered. The killer had stabbed her throat with a knife and had then twisted her head so strongly as to have almost separated it from the torso. Clearly, only someone with tremendous physical strength could have done that.

Mary Galion, the victim, had been living in Detroit only a short while, too short at any rate to have acquired such a dangerous enemy. Her husband was far away, and her mother-in-law at her job; and, still, someone knew Mary was alone and had come to kill her.

When the detective was inspecting the house, a seemingly insignificant fact attracted his attention: there was china in the kitchen cupboard. Mary was murdered in the basement, while upstairs several broken plates were lying in the kitchen cupboard, and separate pieces of china were on the floor.

The plates in the cupboard belonged to different sets, but the broken ones all had the same design, and at first this puzzled the detective. The answer came when he finished questioning Violetta Richard, the victim's mother-in-law, who said the plates were a wedding-day present from her second husband, Emiers Richard, a very tall and physically powerful man, who believed Mary was to blame for his divorce. In a fit of hatred and rage, he killed her and then broke the china. The detective noticed all the broken plates had the same design and that the fragments were scattered far from the victim's body, apparently having nothing to do with the scuffle that had taken place during the murder.

In all probability, an incompetent person would have left the plate design altogether unnoticed and regarded the stray fragments as totally irrelevant to the event.

But no matter how hard a detective tries to arrive at the scene of a crime as quickly as possible. he must first perform certain preliminary actions. First he must take measures to ensure that the scene will be guarded, so that nothing is changed before his arrival. The investigator must also decide whom to take to the scene. Normally, this would be a versatile criminologist who could photograph, detect and reproduce traces by means of specialised techniques; a forensic medical expert, if a dead body has been discovered; criminal police officials (an inspector or detective); and a guide with a police dog. Depending on the nature of the crime, the investigator might also invite other experts to take part in inspecting the site, e.g., a fire safety expert; an automobile technician or engineer; and/or a pyrotechnician and, of course, two witnesses. On arriving at the scene of the crime together with his team of experts. the investigator must not hurry, but first, in a business-like manner:

(a) check whether or not his instructions on guarding the scence of the crime have been fulfilled;

(b) check whether the victim has been given assistance;

(c) learn who first discovered the crime; precisely what was revealed and in what form; and what changes had taken place in the environment since then;

(d) tell the operatives to find possible witnesses and eyewitnesses of the crime;

(e) if information is available, organise undelayed pursuit of the criminal;

(f) specify the boundaries of the site to be inspected;

(g) keep all strangers beyond those boundaries;

(h) survey the site; and

(i) begin careful inspection of the scene.

3. ONCE AGAIN ABOUT "READING" TRACES AND LEARNING FROM "MUTE WITNESSES"

In the first place, an investigator should study and establish everything directly related to a given crime, e.g., forced window, traces near a window, criminal tool and handmarks thereon; fragments of rope with which stolen items were apparently bound; items dropped by the criminal; and many other things.

One night a rural shop in Krasnodar Territory was burgled. The burglar entered through a window into the attic, and then via a manhole in the ceiling into the shop. There he stole various goods and receipts amounting to over two thousand roubles.

When inspecting the shop attic, the investigator discovered twenty(!) cigarette butts. Four days later Savina and Ivanovich, both local residents, were detained as suspects in the burglary. In fact, the day after the crime, they bought a bicycle from another village woman, and on the following day many expensive items in the shop. A subsequent search of Ivanovich's mother's house revealed the stolen goods. Also, when Savina was searched, the operatives found two packs of cigarettes identical to the brand of the butts discovered in the attic.

During an interrogation, Ivanovich said the goods and money (250 roubles) were brought to him by his girl friend Savina, who, in turn, alleged she had stolen them. However, she denied involvement in the burglary. She claimed she found the goods in a nearby forest and that all the purchases were made with Ivanovich's money.

The cigarette butts removed from the scene of the crime and from Savina were sent for examination to a duly appointed criminalist, who conducted a comparative study to conclude that the butts from the scene of the event coincided with Savina's in the manner of finishing and putting out cigarettes.

Then the investigator established that the burglary was indeed committed by Savina, who took advantage of the fact that the shop had been closed the day before and, that night, climbed inside through the attic and carried away the goods. Afterwards, she sat all day in the attic, and that is where she smoked the twenty cigarettes. On the night that followed, she took all the stolen items to the forest, hid them there and, subsequently, together with Ivanovich, took them by bicycle to her mother's house.

Incidentally, there was a case involving a scrap of paper found at the site of a burglary, which at the time caused a greater sensation than even the theft of the famous Mona Lisa from the Louvre. On the morning of April 26, 1927, the officer on duty at the Moscow Criminal Department received a phone call. Speaking in an agitated tone, the caller introduced himself as

the Scientific Secretary of the Fine Arts Museum. He reported that they had just discovered the theft of several unique paintings worth about one million gold roubles. A few minutes later, investigators were already in the Museum. They inspected the site of the crime and questioned some of the employees to surmise the following.

The criminal (or criminals) had entered through the second window from the main entrance. The window was situated at an average man's height; so, the burglar moved a bench standing in the portal, mounted it, and struck the window with a stone to make an opening in the thick cast pane of the outer frame. Then he pushed in his arm and opened the window bolts. Afterwards, he slid in between the frames and pressed out the conventional pane from the inner frame to get into the vestibule.

From the very start, the investigation was complicated by the fact that the Museum employees had disturbed the setting. The yard man, who that morning was sweeping the portal and garden, had thrown into the dustbin a pair of women's underwear and a handkerchief lying at the bench under the broken window and a Museum attendant, on seeing glass fragments in the vestibule the next morning and thinking some hooligans had broken the window, threw everything into a dustbin. A note left by the burglar was discovered behind the inner frame of one of the paintings. The note could have contained his fingerprints, but many people had already touched it before the militia arrived.

Everything indicated that the burglar had acted in line with a carefully thought out plan, having first learned all possible ways of entering the Museum and also the layout of the halls and positions of the paintings. Highly valued masterpieces by Dutch and Italian artists were stolen and two paintings cut out of their frames in vandal fashion.

The glass fragments, underwear and handkerchief were extracted from the dustbin and sent for expert examination to the Scientific and Technical Section, Moscow Criminal Department. But to the disappointment of experts and operatives, the broken glass failed to reveal any fingerprints. Also, the underwear showed glass cuts and minute fragments in the fibre: evidently, when the burglar was pressing out the glass, he wrapped it around

his hands to protect them from cuts and to prevent leaving his fingerprints.

What remained was a note left by the burglar behind the underframe. The text was in church Slavonic, written with ink pencil on letter-paper in stylised characters, and read as follows: "Christ is dead, let death enliven life".

The note was studied by three expert commissions specialising in calligraphy and handwriting, psychiatry and church affairs.

The first commission concluded that the author of the note tried to conceal his personal characteristics by writing block letters. However, it was clear he had some artistic taste and was to some extent good in drawing.

The second commission consisting of prominent psychiatrists inferred that the note was written by a young to early middle-age intelligent person.

Finally, the third commission, which included the Moscow Metropolitan, characterised the author as a connoisseur of church Slavonic and Easter carols.

The collected materials and the experts' conclusions caused heated debates among the criminal department operatives. Some maintained they should look for the burglar among the clergy; others thought the hunt should concentrate on fanatics and cranks; and still others believed the search should be conducted among men of art. And there were some who believed the paintings were stolen by inveterate criminals.

Special inquiries were made into possible involvement of antique shops and intermediaries in deals concerning items of art and curios. However, nothing important was revealed. The investigators also checked all the Museum employees' connections and suspicious persons from among painting restorers and artists, but all in vain.

All of a sudden, one of the paintings was quite unexpectedly found. In August 1927, an Italian by the name of Fellini, who was in Moscow at that time, received through the errand boy of the hotel where he was staying a letter together with the painting itself. The letter was typewritten and signed the "Platter brothers", who offered for sale a painting by an artist of the Early Italian Renaissance. At the same time, they said they were allegedly prepared to give the masterpiece to connoisseurs of art

in Italy. But Fellini, via the Italian Mission in Moscow, reported what had happened to the authorities and handed the painting over to them.

The hunt continued, and making use of the evidence obtained in examining the note, the operatives became interested in a man called Fedorovich. Samples of his handwriting were compared with that in the note found at the site of the burglary, and the experts concerned were unanimous in their conclusion that Fedorovich had written it.

Kochubinsky, who at that time was the most experienced investigator at the Moscow Criminal Department, was entrusted with the job of interrogating Fedorovich.

Fedorovich soon testified that his friend, an artist by the name of Kokorev, had once mentioned knowing about a place where some valuables were buried by people who had emigrated abroad. He, Fedorovich, thought that Kokorev meant the paintings stolen from the Museum. So, early in the morning on September 18, 1931, a group of operatives went to the outskirts of Moscow and began digging. Soon, at $1^1/_2$ metres deep, they discovered a big tin case with two paintings inside; but the others were missing.

Some time later, Fedorovich reported that somebody had tipped him off by phone that there was a letter waiting for him at the post office with a plan showing where the other paintings were buried. According to the new plan, they were to be found in one of the districts of Moscow Region.

The operatives arrived at the edge of a forest with a small man-made trench nearby, and started digging from the embankment. They dug one day, one night, and again one day—all in vain. They estimated they had dug about 500 m. Only by the end of the second day did they extract a metal tank tightly closed with a lid and sealed wtih oil print. This is where they found the Rembrandt and Titian paintings.

Fedorovich was arrested, and at subsequent interrogations named several persons allegedly involved in the burglary. But he was giving false evidence. The truth was revealed when he himself was fully exposed in committing the crime and explained how he had done it. When he was asked why he had left the note, he replied his intention was to mislead the investigation, since the content was essentially religious, and he thought the investigation

would take the wrong track, but that was where he made his mistake.

4. USING DIFFERENT METHODS TO ACHIEVE THE SAME OBJECTIVE

Methods of inspection may differ. The scene of a crime may be inspected from centre to periphery or vice versa. For instance, if a dead body was discovered in a forest, a field or alongside a road, it would be advisable to begin inspecting from that place and then, moving along a spiral, to gradually encompass new sectors.

However, if a crime was perpetrated in a building, the investigatior may move from the periphery to the centre, specifically along the route taken by the criminal. When a large area is to be inspected, it may be split into squares and strips. In any event, the inspection must be thorough, consistent and detailed. In inspecting every site, object or item with traces, the investigator first examines them without changing their position, touching them or making any changes. Afterwards, and after establishing the location, state and position of the object, he begins to study signs that were previously unapparent.

The specifics of inspecting a dead body by an investigator depends on the nature of the object in question and the compulsory presence of a forensic medic or some other physician. Inspection of a dead body at the site where it was discovered is stipulated as an independent investigatory action by the criminal-procedural codes of some socialist countries, e.g., the USSR, Hungary and Poland.

Inspection of a dead body essentially includes all the surroundings, but chiefly nearby items or those causally connected with the death and with the dead body itself, e.g., criminal tools, weapons, traces of a fight and/or pieces of clothing. In inspecting the dead body, the investigator should first of all establish its location, position, and condition, and also the type and state of the clothes thereon, i.e., whether they are torn, unbuttoned, rolled down, etc. After taking survey pictures of the entire body and surrounding items, one should take close-up photographs of injuries on unclothed sections of the dead body, tears on clothes and also objects relating to the inspection of the body, e.g., car-

tridge case, clothing items, etc. In recording injuries on a dead body and damages to clothing, the investigator notes their type, location, size position with respect to one another. Besides recording this data in a special document and by photography, schematic contour drawings of the body and its parts may also be of use.

Considerable attention is given to revealing and recording blood stains both on the dead body and its clothing and on surrounding items. In this case, the records should characterise the stains by indicating whether they are in the form of pools, streaks, drops, etc. Again, photographs of blood stains should distinctly record their shape and position with respect to each other, so that this evidence may be available to experts to determine the mechanism of trace formation.

Special attention is given to the type and condition of *livor mortis,* rigor mortis, maceration, body temperature, etc. Based on this information, a forensic physician can infer the time and cause of death. Despite the fact that such inferences are of a consultative nature, not to be recorded in any document and not valid as evidence, their role is highly important. In the initial stage of an investigation, they can be used to construct investigatory versions and to determine the tasks to be solved in tracking down a suspect.

The details of inspecting a dead body largely depend on the cause of death and the way in which the victim was killed. If death occurred as a result of shot wounds, inspection would chiefly be concerned with the marks and locations of entrance and exit holes; determining the shot direction and range; detecting the cartridge case and bullet; and recording the marks indicating the position of the shooter.

In inspecting injuries inflicted with cold steel or similar objects, principal attention is shown to the marks and locations of those injuries. The marks are needed to search for and identify the criminal weapon, and the locations to reveal the mechanism whereby they were inflicted.

If a dead body were found in a noose, the latter would be removed (without undoing the knots) to inspect the strangulation groove on the neck. Particular attention should be given to sites to which the noose free end was secured. In inspecting these sites, the investigator must determine the direction in which the

wood paint or fibres were displaced. The results of such an inspection would subsequently make it possible to determine whether the victim had committed suicide or whether the person in question was hanged after having been murdered in another way. If he was strangled by closing the respiratory tracts with a pillow or some other item, the investigator could take measures to find the latter with traces of teeth marks or saliva.

In case of suspected murder by poisoning, i.e., when someone perfectly healthy has suddenly died, and witnesses have testified that before dying the victim suffered from convulsions, vomiting and pains in the stomach, inspection of the dead body would be quite specific. Special attention is given to such signs of poisoning as change in skin colour, colour of *livor mortis,* condition of eye pupils, etc. Also, measures should be taken to reveal and remove secretions, such as saliva, vomit, etc., and medicinal preparations, tablets and powders, irrespective of the labels they bear. Remains of food, dirty cutlery and garbage can contents should also be inspected and, if need be, removed. The same is true of devices that may have been used to administer posion, e.g., metal or rubber syringes, etc.

Material evidence is examined either during the inspection at the scene of the crime, during the search, extraction or elsewhere at the place of investigation. Nowadays, as investigators become increasingly equipped with advanced criminalistic devices, material evidence is more and more frequently examined under the best possible conditions. This is especially true concerning the inspection of objects with microscopic superimpositions, e.g., microfibres, microparticles, etc.

The concrete tasks and inspection techniques for material evidence largely depend on the specifics of the crime, nature of material evidence and significance attached thereto in a given case.

In inspecting an object that served as a criminal tool, the investigator notes its location, purpose (axe and/or knife), common and specific marks, condition and presence of flaws. Special attention is given to the presence of superimpositions on the tool surface, e.g., of blood, hair, paint, etc.

Objects that have retained criminal traces are inspected to study and record them in detail, specifically with regard to their location, configuration, size and specific marks. The extent to

which the description of a trace is detailed in the record depends on its nature and on the degree to which its marks may be reflected by photography, drawing and/or video recording. For example, in recording in a document microscopic objects, e.g., microfibres, microparticles and/or microscopic amounts of substances, it is important to specify their location on clothes, and the way they are combined with the carrier object, namely whether they have penetrated the fabric, are stuck to the surface, etc. The inspection of trace-bearing objects is performed so that both the inspection itself and the post-inspection results, recorded marks and trace models would make it possible to judge of the marks of the object which left the trace and also of the trace origination mechanism.

In inspecting items which were objects of criminal action, it is especially important to study their common and specific marks in order to judge of their type, purpose and condition, and also to examine the marks that help to individualise a given item and distinguish it from similar ones. This also concerns money, valuables and other similar articles considered as material evidence.

Documents are inspected both to establish the circumstances outlined or certified in a given paper and to reveal possible marks of forgery. First, one should examine the document's outer appearance and determine its form, whether it corresponds to the original form of, say, a diploma, certificate or reference paper, and also its purpose, content and presence and type of details, e.g., seal, stamp and/or signature. Inspections designed to reveal erasures, etchings, additional printing or typing, etc., require the use of specific techniques and equipment, e.g., examination "in light", magnifying glasses, microscopes, ultraviolet illuminators and electron-optical transducers.

5. THE INVESTIGATOR'S "MAGIC CRYSTAL"

To find objects invisible to the human eye and examine something barely visible, the investigator must have at his disposal highly up-to-date devices.

The modern Sherlock Holmes need not worry so much about the absence of indirect clues and, thanks to various technological devices, he would find it pretty easy to pursue a criminal even over roofs and through subway tunnels. When US gangsters kidnapped the son of Frank Sinatra, the American singer, FBI

agents hid a midget transmitter the size of a pea among the ransom money. Then they kept close watch in their cars near the place where the ransom was to be picked up and listened to their direction finders. Finally, the transmitter betrayed the kidnappers and they were caught.

Many examinations of evidence are complex and involve a number of technical devices. For instance, to reveal traces of poison, new identification techniques have been developed, including thin-layer chromatography, fluorescent analysis, X-raying of microstructures, spectrography and radiometric methods. Fingerprints can now be revealed even when almost no traces remain. Innovative means for studying surfaces based on the use of polarised light or on monitoring reflected rays in a narrow wave range, and also analysis of the absorption spectra of chemical substances constituting a fingerprint facilitate the search of crime traces.

At the British Atomic Research Centre in Harwell, scientists have recently developed a method for detecting fingermarks on fabrics, something no one could do for a long time. The technique is based on the reaction of sulphur dioxide with certain skin excretions. Inasmuch as the latter are present along the lines upon the finger tip the distribution of sulphur precisely reflects the fingerprint pattern. If the sulphur dioxide contains a radioactive tracer, autoradiography could be used to obtain a fingerprint image. Fabric strips with such images are placed for 30 minutes in a chamber with a 0.0001 per cent sulphur dioxide concentration with the tracer atom.

Then these strips are pressed to an X-ray plate and kept for 10 hrs; afterwards, the plate develops a black-and-white image, which reproduces an exact picture of the papillary pattern reflected in the fingerprint. However, this technique has not been officially accepted in the USSR.

A portable US-made device called Validator makes it possible to check the authenticity of banknotes on the spot, without sending them for expert examination. If the banknotes are genuine, the Validator signal lamp flickers when the device is passed over them. Validator operates along the same principle as a tape-recorder: its magnetic head interacts with the iron oxides contained in the paint used for manufacturing all US paper money. The same head also measures the distance between the

pattern margins, and all these factors are used to confirm that the money is genuine.

We have mentioned only a few innovative devices which together with the aid of an expert in a given field, an investigator could use in his quest for the truth. There are also a number of modern technical appliances that can be used directly by the investigator himself: special sets of instruments for working with various types of traces, and also diverse illuminators ranging from powerful lamps with reflectors installed on special machines or trailers to portable illuminants with autonomous power supply. In addition to conventional illuminators, investigators may also use special fixtures for inspecting an object in ultraviolet and infrared rays.

To detect and inspect handmarks and traces of burglary in difficult-to-reach places, investigators use mobile mirrors installed on long flexible handles, as well as conventional, special and illuminating magnifying glasses.

Special metal detectors are used to reveal metal objects, e.g., bullets and/or cartridge cases.

There are also other detecting devices, e.g., for finding and removing metal objects by means of powerful magnets, and for revealing dead bodies buried and in water.

Handmarks discovered at the scene of a crime are treated with special powders and transferred onto a trace-copying film, which is then treated with chemical reagents and fixed with polymer compounds.

Polymers are also used to obtain casts of burglary traces. Casts of large-size traces are made from plaster or plastics.

Special portable vacuum cleaners equipped with grid filters, sticky ribbons, porolon foam sponges and other devices are used to detect and remove microparticles, microfibres and the like.

The investigator uses a wide range of devices to inspect the surfaces of objects, which, judging by the situation at the scene of the crime, the criminal may have touched. These might be door and safe handles, furniture, light switches, automobile steering wheel, etc. He must be aware that the best trace image would develop over hard smooth surfaces, e.g., glass, tile, polished furniture, etc. Handmarks may be both exfoliated and layered. Exfoliated marks are readily discernible if left by dirty hands (with blood, paint or mud on them).

Perspiration marks are barely visible on solid surfaces and altogether invisible on paper, cardboard and plywood.

The techniques for revealing traces depend on how well they are revealed. Yet, in any event one would first use those that do not change their external appearance, and then those that do.

To inspect objects, one should put on rubber gloves. If these are unavailable, one should hold the object where traces suitable for identification could not have remained, e.g., bottom or neck of a bottle, or corrugated surface of pistol handle, edges of glass fragment, etc.

In looking for handmarks, one should first of all use directed light, turning the object in front of the light source or illuminating it from different angles. The traces thus revealed should be immediately photographed. Special magnifiers with attached lamps are used to search for traces.

If one fails to reveal a trace by illuminating the object, various physical and chemical techniques may be used. Physical methods include the treatment of traces with various powders or treated with iodine vapours. Light powders of aluminium, bronze, zinc oxide, lead oxide, etc., are used to treat dark surfaces, and dark powders of iron, graphite, copper oxide, soot, etc., to treat light surfaces.

Powders are applied with a soft flat brush made of natural kolinsky or squirrel hair, and excess powder should be carefully removed. Iron powder is applied with a magnetic brush, the magnet being installed in a plastic case.

Powder-treated traces are copied onto a sticky dactyloscopic film (either dark or light). To that end, the transparent protective layer is removed from the film and then pressed and tightly rolled against the sticky surface to remove air bubbles. The film is then removed from the surface of the object and recoated with a protective layer.

Invisible traces on paper are treated with iodine vapours using a special iodine tube that is available in the investigator's set. An iodine crystal is placed in the tube, which is then heated to direct the emitting iodine vapours onto the site examined. Iodine-developed traces should be immediately photographed, since they will again become invisible when the iodine evaporates. Iodine-revealed traces may be copied onto iodine-starch

or iodine-dextrin films and also onto photographic paper pretreated with 0.2 per cent ortho-tolidine in distilled water. Chemical methods for revealing invisible handmarks involve treatment with compounds and substances that react with perspiration secretions to make traces visible.

To reveal traces, one normally uses a 2.5-10 per cent aqueous solution of silver nitrate (lunar caustic), 0.2-8 per cent ninhydrin in acetone or 1-1.5 per cent alloxan in acetone.

6. SINGULAR OR NEGATIVE CIRCUMSTANCES

We have already mentioned that in inspecting the scene of a crime, the investigator should, first of all, pay attention to the circumstances directly related to the crime in question. But what should one do about other objects, circumstances and facts? What to do if the inspection does not reveal a direct and unambivalent relationship between a crime and some circumstance?

One should remember that, at the moment of inspection, the investigator still knows very little about the perpetrated crime, and it would not be surprising if he regards something as being unimportant for the investigation and fails to pay close attention to and record that circumstance. Possibly later, having collected other evidence, he might recollect what he failed to examine, but then it would be too late to restore the original situation.

To ensure that this does not happen, the investigator must note everything that appears unusual in a given situation at the scene of a crime.

Sometimes, the investigator's experience is sufficient. Here is an example from the records of Scotland Yard.

A murdered male was found in a totally isolated room locked from inside. The room was on the first floor, and it would have been impossible to enter it through the window, since the wall was absolutely flat, without ladders, drain pipes, ivy, and so on. Yet, it was clear that the murderer had shot the man through the window. But how?

On the ground under the window, the police discovered strange oblong traces. They were so singular as to draw the attention of the inspector in charge of the case, and later he suggested a version that proved correct. He said the murderer

had come up to the window on stilts. Subsequently, it was discovered that the lower ends of the stilts were wrapped in pieces of sheep hide. So, in this case, the "singularity" of the traces played a decisive role in exposing the crime.

Another kind of "singularity" could attract the investigator's attention only after, by questioning those present, he learned a given family's daily routine, an enterprise's working hours, the normal arrangement of items in a room, and other similar evidence. Just recall the broken tea set in the Detroit murder case cited in the beginning of this chapter. That circumstance appeared quite singular and initially inexplicable.

However, "singularities" which, to be understood and analysed, require the use of special criminalistic knowledge and experience, are the ones to occur most often and to have maximum significance.

Most criminals also realise the importance the scene of a crime has for clues, and for that reason sometimes intentionally change them, or, as criminalists would say, they feign a situation.

As a rule, they do this to conceal traces of what really happened. For instance, a criminal could try to make it look like a murdered person committed suicide to conceal that the latter had actually been the victim of a homicide, or could feign theft to conceal self-perpetrated robbery.

So-called negative circumstances, i.e., factual evidence that had to be present if the feigned situation were to correspond to reality but which was absent, or evidence not supposed to be present but nonetheless revealed, would make it possible to discover that a situation had been feigned.

For example, this is how one violent assault was feigned. A man called Rukavitsky filed a written declaration to the Moscow Criminal Department that his flat had been robbed by armed assailants. According to Rukavitsky, one day when he was at home alone somebody knocked at the front door. When he opened it two armed strangers, both males, entered the room. They threatened him with guns, tied him up and took him to the dining-room. At the same time, they removed the transom above the door leading into the room that belonged to Mironova, Rukavitsky's relative, got inside, stole many different things, money and valuables belonging to Mironova, and disap-

peared. After they left, Rukavitsky, not without difficulty, freed himself of the rope and went to the militia. The operatives and criminalists who arrived at the scene of the event instantly began to inspect the flat. The place had four rooms, two of which belonged to Rukavitsky and his family, one to Mironova, and one to Vasyutina. The doors leading to Rukavitsky's and Vasyutina's rooms were open, while Mironova's was locked with a French lock. All the things in Rukavitsky's and Vasyutina's rooms were in their usual places.

The removed transom above the door leading to Mironova's room was tilted to the passage wall; a sheet of plywood glued over on one side with the same kind of paper as the passage walls was lying alongside; and lying next to this was a painting. It was found that the transom was covered inside the room with that painting and from the passage side—with the papered plywood. The cord with which the painting was fastened to the wall was missing.

In between the door frame and the door itself, there was a slit that made it possible for a knife blade to readily open the door by depressing the lock collar and that was actually what the criminalists did.

On the door-post and side of the door itself where the lock was located, the criminalists discovered four impressed traces from some hard rectangular object.

Mironova's room was in a total mess: suitcase and drawers were open and all the things lying about. In Rukavitsky's room, the operatives found a hunting rifle lying on the floor, and a towel, rope and thick string, with which Rukavitsky alleged he was tied, on the table. A nail, on which the painting used to hang, was attached to one end of the string.

When the operatives compared the plier handles with the impressed traces on the door-post and on the door itself, it turned out that they fully coincided in shape and size.

The operatives compared the evidence obtained during inspection with Rukavitsky's testimony and realised that the situation at the scene of the crime did not correspond to his testimony. They thought it was strange that the burglars, having broken into the flat, should decide to enter a locked room instead of making use of the open doors of the other rooms with no less valuable things inside. Nor was it clear why they had made

their way via the transom, when they could have easily pressed open the door lock with a knife. All in all, it seemed unlikely that strangers could have known about the transom, since the papered plywood made it invisible.

Rukavitsky asserted that the burglars had first tied him up, and then gone inside Mironova's room. Now the question was, how could they have tied him up with the painting string before the painting was removed? Finally, the coincidence in shape and size of the plier handles with the fresh traces on the door indicated that the door had been pressed open by those handles. Besides, Mironova testified that never in her life had she used anything but her key to open her door; and that, hence, she could not have left any traces on the door. All these contradictions were negative circumstances that gave ground to suspect Rukavitsky of feigning robbery to conceal a self-perpetrated burglary, and these suspicions were confirmed during a subsequent investigation.

But sometimes a wrongly-interpreted true situation may appear to be feigned: burglars broke inside a cafeteria and stole over twenty bottles of vodka and some foodstuffs. When the investigator arrived at the scene, he found the floor flooded with vodka. He reckoned that since to break open the entrance door would have required considerable effort, the burglar was physically very strong and, moreover, experienced enough to have flooded his traces with vodka so as to prevent the police dog from finding them. It turned out that the burglars were three teenagers who had poured the vodka onto the floor to steal the empty bottles so that the following day they could receive a cash deposit for turning them in. They had broken the door bolt by sticking in an iron bar and all three of them hanging on it together. Naturally, they did not think of feigning a burglary, albeit everything the investigator saw at the scene of the event first prompted him to think of that.

Finally, one may come across totally exceptional situations where the criminal feigns a feigned situation. An investigation of a criminal case involving a shop burglary in the town of Orel established that the criminals had entered the basement after having broken the door lock. From the basement, through a hatch in the floor, they entered a storeroom connected with the shop itself. The hatch boards had been sawn through, even

though the hatch cover could have been readily lifted; also, they could not have sawn through the boards without lifting the cover. In the shop, the floor was covered with silk fabrics. A subsequent experiment showed that over 15 minutes would be needed to unroll them. The shop was in chaos. Most of the goods kept on shelves had been thrown down. After putting everything in order, the sales personnel declared that almost nothing had been stolen. Normally, after closing, the shop was locked in the presence of the sales people. But on the evening before the burglary, the shop manager had stayed behind to write a report, after which he locked the premises alone.

It was found that over 6,000 roubles worth of goods had been stolen. But an audit revealed that a shortage worth 3,700 roubles had been concealed throughout the year already prior to the burglary. Inasmuch as the shop manager lived beyond his means, systematically misappropriated part of the receipts and committed various other abuses, the investigator concluded that he had stolen the money and goods worth 6,000 roubles and had feigned the burglary. A year after the shop manager was convicted, the burglars were arrested, and, in addition to other offences, they pleaded guilty of that very crime. When interrogated, they testified they had intentionally created a situation that would show a feigned burglary. Actually, they wanted to take vengeance on the shop manager, with whom one of the burglars was at odds. As a result, it became clear that, though the shop manager was guilty of fraud, he had not feigned that burglary.

7. THE IMPORTANCE OF RECORDING REVEALED FACTS

During an inspection, and after it is over, the investigator draws up a record of inspection at the scene of the crime. Here he indicates who, where, when, in what connection and based on what norms of the criminal-procedural code the inspection was performed, and also who (apart from himself) was present. This evidence is found in the so-called introductory part of the record, while the second and most detailed part would list what and in what sequence was revealed and described, the original situation at the scene of the crime wiht special reference to the form and condition of all the material evidence.

Naturally, it would hardly be possible or even desirable for that matter, to record absolutely everything revealed at the scene of a crime. Hence, in drawing up this section of the record, the investigator should note everything directly related to the crime and everything that appears to be singular.

Having finished the descriptive part of the record, he draws up the final section where he indicates the photographed, filmed or video-recorded objects; the items removed and where they were sent; and the traces from which casts and/or copies were obtained.

Next he writes down any remarks he might have. After this, the record is signed by all the participants in the inspection and the investigator himself.

Given both the extraordinary importance of a record and the fact that it is a source of evidence in a given case, it is imperative that it be written.

8. CRIMINAL METHODS

Criminalists say that a criminal may take a thousand roads to leave the scene of a crime, and the investigator only one. And, again, it is the inspection of that scene that can help the investigator find that road, since through inspection he can determine the way in which the crime was perpetrated, reveal the criminal's "hand" so to speak, which, like a calling-card, gives information about its owner. Centuries ago, investigators would consider criminals' habits to expose a crime. As early as the 15th century, special volumes listing swindlers' and burglars' techniques were published in the German states. The books were entitled *Baseler Rathsmandat* and *Lieber Vagatorum,* and were written to help prevent swindles and burglaries. In 1720, G.P. Haehn published a book describing numerous types of fraud. He called it *A Swindler's Lexicon* and reckoned it would help the privileged classes protect themselves from rogues. In 18th century in Britain, the *Newgate Calendar,* a reference book on inmates at the London Newgate Prison, was published. This was a record of criminals' biographies and descriptions of how they had committed their offences. If the method of a newly perpetrated crime coincided with one of those described in the

manual, and the person who had previously used it was already outside the prison walls, he would almost always be suspected of committing that new crime.

Criminalistics studies and classifies criminal methods because one of its principles is "to choose the method for exposing a crime based on the method of committing that crime". This is achieved by studying and summing up the practice of combatting crime; by providing express information on all the "novelties" in the field; and by forecasting future criminal techniques and taking timely preventive measures.

A method of perpetrating a crime is essentially a definitely conditioned system of actions for preparing, committing and concealing a crime. Every method has a corresponding set of applicatory marks which are revealed in changed surroundings at the scene of a crime; in traces that occur as a result of criminal actions; in the nature of criminal preparations; and in the measures taken to conceal the crime. An inspection of the scene of a crime could play a decisive role in discerning those marks.

In 1963, on one black Thursday for the famed Scotland Yard, a group of gangsters committed a daring robbery of a mail train to carry away 2,552,000 pounds sterling. It was about three in the morning when the Glasgow-London night mail train running at 75 miles an hour was stopped by a red light at a deserted station. David Whitby, the assistant engineer jumped off with the intention of using an emergency phone to call the light signalling division and learn why the train had been stopped. But the telephone was dead because the wire was cut. On his way back, Whitby was stopped by three strangers, who threatened to kill him if he shouted.

Meanwhile, Jack Mills, the engineer, was lying on the cabin floor after being hit with a rag-wrapped iron rod. By the time he had regained consciousness the gangsters had uncoupled ten wagons and forced him to drive the two remaining ones (one of them with the money) a quarter of a mile ahead, where they had two pickets with white rags flying on top stuck in the ground. The train stopped on a bridge over a highway. The gangsters took Mills and Whitby off the locomotive, handcuffed them together and laid them on the highway shoulder. Then they broke open one of the wagons, ordered the three men from the mail convoy to lie face down on the floor, unloaded 120

sacks of money (total weight 3.5 tons) onto lorries standing by at the bridgeside and escaped.

The whole job took only twenty minutes, but 45 minutes were needed to raise an alarm because the engineer, his assistant and the three postal officials accompanying the second (cash) wagon were ordered to neither move nor shout for half an hour, and they were reluctant to imperil their lives. Meanwhile, in the uncoupled ten wagons, seventy-five sorters quietly continued to go about their work, for they had taken the unexpected stop for a normal one. The conductors did not even suspect the vans had been uncoupled because the job was done with professional skill while the hydraulic system was shut off. The guard in the last wagon thought the stop was due to an engine break-down and, in keeping with existing regulations, took a signal lantern and went back to warn a train that might have followed behind. After the frightened witnesses of the robbery made it to the nearest farm to call the police, they found the telephone wires were cut, just as they were at neighbouring farms. The men on duty in the local dispatcher's room were totally unaware of the hold-up. The signals along the entire route were green, and could not have been otherwise, since the gangsters had not cut the signal wires. The green lantern at the Siers Crossing was covered with an old glove, and the red lamp had been lighted up with four batteries from a pocket flashlight.

On the first day after the robbery, no one even appeared to know the exact amount of money and diamonds stolen. But how, then, did the thieves learn that precisely on this train such a large sum of money would be travelling in a conventional wagon not in the usual armoured coach. It was also not clear who had informed them that three armoured coaches were undergoing repairs. Another enigma was how they had managed to get the army lorries. The final question concerned the utter incompetency of Scotland Yard, which, as people now assert, was forewarned of the hold-up several months before.

The British police searched for the thieves in several directions. One version was based on an analysis of the method used in the robbery. Police officials studied archives to compare the "mechanism" of the job with various circumstances of similar crimes. They studied the robbery of a mail van at Brighton

Terminal in April 1962, when 15,000 pounds sterling were stolen; the attempted robbery of safes containing 10,000 pounds in November 1962; the Irish Express robbery in February 1963; and the robbery in broad daylight of gold bullions worth tens of thousands of pounds from a storeroom in London City. But a comparison of all these cases with the Glasgow-London train robbery showed the methods used to have been different. Again, the investigation was complicated by the fact that all these crimes were still unsolved.

Then Scotland Yard distinguished those elements in the method used to rob the train which indirectly indicated the criminals' habits and range of knowledge, and could therefore to some extent direct the police to the social groups among which they should look for the culprits. Specifically, the thieves had a knowledge of wagon coupling systems and professional skill in uncoupling wagons; knowledge of the signalling system used by British railways and also of relevant signalling devices; possibility to obtain information about when and by what wagons the money was to be transported; use of army lorries; and so on. Subsequently, when the criminals were identified, all these elements helped to prove their guilt. The search itself was facilitated by the fact that the police found the farm where the criminals had prepared for the hold-up and had stayed for a while after robbing the train. The farm was 15 miles from the scene of the crime, and the thieves had purchased it several weeks before. This was where they left the lorry used for reloading the money from the mail wagon and also twenty empty sacks. At the same farm the police also discovered some of the thieves' fingerprints. They intended to burn the farm after the hold-up, but failed to do so by an oversight; this proved to be their undoing. But the main thing we wish to illustrate by this example is that when the surroundings of a crime are analysed in a proper way, the investigator can construct a version and chart ways for verifying it.

9. HOT ON THE HEELS...

In socialist countries, it is considered especially important to combine an inspection of the scene of a crime with an immediate, effective investigation, "hot on the heels" of the crimi-

nals. For this purpose it is necessary to ensure the quick arrival of investigators and operatives at the site of the crime; acquaint that group with the facts; determine the most important witnesses, traces and other evidence; discuss and decide upon a plan for hunting down the criminal; and organise that hunt with all necessary forces and equipment.

To solve these tasks and track down the criminal, it is essential to organise a number of actions in conjunction with the inspection and based on its results. In Hungary, the Ministry of the Interior has a 24-hour call-in service which receives the bulk of all information on crimes. After the man on duty records a communication either in writing or on tape, he sends a patrol (the nearest motorbike or car unit) to guard the scene of the crime; reports to a superior; instructs and sends two groups to the scene, one to inspect the site and the other, consisting of operatives, to pursue the criminal or criminals; provides communication and information for personnel working at the scene of a crime; takes measures to surround a given territory or block off transportation lines; and, when need be, informs frontier posts.

In Czechoslovakia, there are special centres operating under the Ministry of State Security to improve interaction between different departments. These centres, in addition to organising inspections at scenes of crimes, direct and coordinate all organisational measures for pursuing a criminal and for surrounding territories and blocking off transportation lines in accordance with standard plans and their variants; organise continuous flow of information and, based on it, take instant measures to provide security units with the manpower needed to check specific sites and alibis; and establish liaison and coordination between various departmental units. For this complex work, operation centres select officers highly experienced in solving crimes.

Groups for inspecting the site of a crime and for pursuing a criminal are organised in accordance with definite plans. The inspection group includes an investigator, a criminalist-technician, a local police officer, police dog with attendant, patrol officer (Hungary), an expert criminalist, and a physician (Czechoslovakia). The group involved in the pursuit includes a leader, his deputy, a sniper, police dog with attendant, patrol policeman and two car drivers (Hungary). In Poland, when a serious crime

is committed, an operative group consisting of several units is organised to conduct the chase, investigate, handle operative and intelligence work, keep records and perform analyses and maintain supplies.

It is very important to begin investigating a crime as soon as possible and to collect and process information received in the course of inspection at the scene of the crime. In the German Democratic Republic, the results of questioning of witnesses at the scene of a crime are used to make a composite portrait of the suspected criminal; witnesses are shown a car catalogue to determine the vehicle used by the latter; and the features of all the stolen items are recorded in detail. This information is then instantly conveyed to search units.

Special information systems are created to make these reports sufficiently efficient for processing and using that information. The availability of such systems makes it possible to select and accumulate information of definite content, e.g., on the methods used in committing a crime, and also to instantly bring that information to the attention of the person who coordinates the actions of the inspection group and the pursuit group. Technically, this is done by comprehensive and continuous communication involving the radio, telephone, teletype, phototelegraph, and so on. Such programmes require the extensive use of computers.

An important factor that affects a correct analysis of the situation at the scene of a crime, and also the organisation of activities aimed at quickly solving a crime is the timely investigation and assessment of the traces and material evidence revealed on the spot.

Chapter 11

AN INVESTIGATION EXPERIMENT

1. THE CONCEPT AND TYPES OF INVESTIGATION EXPERIMENT

An investigation experiment is an investigatory action involving special tests to verify the evidence collected, obtain new evidence and check and assess versions on the possibility or impossibility of specific facts that have bearing on a given case.

In socialist countries, the law does not permit experiments that might endanger people's health or life, damage public or personal property, violate public order and/or cause an individual to suffer indignity.

The bounds within which an investigation experiment can be conducted are determined by facts whose existence may be inferred on the basis of experiments. If a fact is said to be related to the case, this would mean it must be proven.

Investigatory practice has long been familiar with the experimental method of investigating the circumstances of a given case. For instance, there is a record of an experiment conducted in mid-19th century Russia by an investigation commission which inquired into the death of Maria Pyatnitskaya, daughter of a retired lieutenant-colonel. The investigation, which continued for over 20(!) years, was trying to ascertain whether Pyatnitskaya had committed suicide or was murdered by the landlord Platon Engelgardt, suspected of having had a love affair with her. The Commission tried to experimentally establish the audibility of the shot, the penetrating power of the charge and the victim's posture at the moment when she was wounded. This is how the event was described in the Commission's report:

"In the shed where Pyatnitskaya shot herself, a shot was fired from a buckshot-charged rifle; the sound was heard in Engelgardt's residence, but it was so muffled that it might have

been heard only by people who were expecting the shot (witnesses in the case testified they did not hear it.—*Author*). The shot was fired at a range of four steps from a rifle charged with fifty-two pellets into the leather covering of a pillow stuffed with tow; the leather was wrapped with canvas. Having made a 1.5-in hole in the canvas and leather, the charge slightly tore the edges to remain in the pillow; and the hole pattern was absolutely similar to the torn hole in Pyatnitskaya's night dress, and the charge to that found inside her stomach. A similar shot was fired from a rifle whose barrel was placed next to the leather covering of the pillow. It penetrated right through the pillow, and the charge went deep into the ground to leave a thorough hole in the pillow not wider than the rifle barrel; this time the edges were not torn. Hence, it is clear that if Pyatnitskaya had shot herself by holding the rifle directly against her body, the charge could not have remained inside her. The investigators invited a girl of the same height as Pyatnitskaya, gave her a rifle similar in size to that used by her (by that time, the actually used rifle had been sold), and told her to press it under her left breast, pointing it from her left side towards the right side of her back. The experiment showed that it was impossible for the girl to pull the trigger with her right hand; it could have been done with her left hand, but with great difficulty and provided the person in question was left-handed. But, according to Pyatnitskaya's mother and grandmother, the deceased was not."

Without going into a detailed analysis of the methods used in these experiments or questioning their results, what is noteworthy is the very fact that the Commission tried to resolve such complex and substantial investigatory problems experimentally.

In practice, we might come across the following types of investigation experiments:

(a) one designed to establish possible perception by a person of some fact or phenomenon;

(b) one designed to establish the feasibility of some action;

(c) one designed to establish the possible existence of some phenomenon;

(d) one designed to establish the mechanism of specific details of an event; and

(e) one designed to establish the forming of traces relating

to an event that had become known during the course of investigation.

2. PREPARING FOR AN INVESTIGATION EXPERIMENT

An investigation experiment is performed by the investigator in the presence of witnesses. The following people may take part in the experiment: witnesses, victims, suspects, the accused and also experts and their helpers invited to take part in experimental actions.

Having decided to perform an investigation experiment and having fully understood its purposes, the investigator begins due preparations.

Prior to leaving for the site of the experiment, he should: (a) determine the essence and method of the experiments to be performed; (b) establish the sequence of the planned experiments; (c) decide on their timing; (d) choose their place; (e) select the participants; (f) prepare the material evidence or substitute items which may be needed; (g) check the readiness and completeness of required scientific and technological devices; and (h) prepare the needed vehicles.

At the site of the experiment and prior to beginning the investigator should clarify the changes that occurred in the surroundings and take into account what he would have to do to reconstruct them, if need be; photograph the surroundings prior to reconstructing them; establish signals and communication devices between the participants in the experiment; invite witnesses, if they had not arrived together with him; and explain to the participants where they should be and what they should do in the course of the experiment.

Let us now examine some of the above-listed preparatory measures. Determining the essence and method of the experiment is a vital part of the investigator's preparatory work; this in effect, is the planning of the experiment.

The question of instructing the participants in an experiment deserves special attention. Normally, the investigator would have to decide to what extent each participant should be informed of the experiment's substance and his duties during the experiment.

All participants without exception must clearly understand where they should be and what they should do during an experi-

ment. In this stage of the experiment all the participants should be equally informed. Experts and witnesses must be informed concerning the essence and sequence of the experiment. However, in deciding to what extent the rest of the participants, especially those who would be performing experimental actions, should be informed, the investigator must take into consideration the psychological factor of anticipation since conscious anticipation of any event is known to cause voluntary attention thereto.

When his attention is involuntary, an individual does not force himself to pay attention to a given object or phenomenon. His attention is attracted by the interest, significance or unexpectedness of the object to be perceived.

If an individual is aware of a coming event, he is likely to observe the object more fully. He will be distracted from everything except the set objective, his attention is focussed on a single object.

In the transition from involuntary attention to voluntary attention, the anticipation of definite impressions, events and/or facts plays a significant role. Not infrequently, anticipation acts to help us notice something that we would otherwise never have perceived.

A person who had unexpectedly become an eyewitness to crime would react with involuntary attention. However, the attention of participant in an investigation experiment, someone who is expecting some event, would be arbitrary and concentrated on the anticipated deed. Consequently, the degree of perception and the quickness of response would naturally differ. For instance, a person anticipating an experimental shot would be more likely to hear it than one whose attention was not concentrated on perceiving it. Similarly, a car driver anticipating the sudden appearance of an obstacle on the road would be better prepared to overcome it than one who did not expect it.

The logical inference would be to recommend that the participants in upcoming experiments not be informed of their essence so as not to focus their attention on some anticipated fact or event. Yet this is unrealistic. Participation in an experiment is essentially voluntary and conscious. Hence, some information is necessarily available. The only debatable question is how detailed it should be.

A person was run over by a suburban train. The authorities first thought of instituting criminal proceedings against the locomotive driver. But, when questioned, he declined to plead guilty and explained that under existing regulations he was required to switch on the brakes 200 m away from the person on the track. However, at the time of the accident visibility was poor, and he saw the man at only about 100 m. And though he did take measures to stop the train, it was already too late. His assistant corroborated this testimony.

An investigation experiment was performed to determine whether the driver and his assistant had testified correctly. The same train again set off, but this time operated by a different team, which was joined by the two accused, witnesses and the investigator. The speed was the same as during the trip when the accident occurred.

When preparing for the experiment, the investigator realised that a dummy would have to be used instead of a man. But the question was whether or not to forewarn the participants that a dummy would be placed on the track. To do so would have forewarned them, to some degree, of the upcoming need to make an urgent stop, whereas the locomotive driver who had run over the man was altogether unaware, up to a certain moment, that an obstacle would confront him. On the other hand, not to forewarn them would have placed the men in conditions that would be too real, and this might have caused serious consequences if, in running over the dummy, the participants in the experiment should think their victim was a real human being.

The investigator decided to tell the men that a dummy would be lying on the track, but not to indicate exactly where. He proceeded from the postulate that the men always should be in a constant state of preparedness for the sudden appearance of an obstacle on the rails.

Having covered a certain distance, the locomotive driver noticed the dummy and started to brake, but it was already too late to prevent it from being run over. By measuring the distance from the spot where braking was started to the dummy, the investigator established that it was approximately the same as the one during the actual accident. Thus, the results of the experiment proved quite convincing.

But supposing the driver in the experiment were successful in his attempt not to run over the dummy? Would that have meant that the original driver could be accused of a crime? In this case, the experiment would have ostensibly failed to attain its purpose: if the experimental driver failed to stop the train even when he knew of the dummy, that meant he would have really been unable to stop it in the actual accident when he was not forewarned that a man would appear on the track. Yet, if, knowing of the dummy, the driver could have stopped the train without running over, that would in no way have indicated that he could have prevented the accident involving the man. It could be presumed that the driver in the experiment had not run over the dummy because he had anticipated the obstacle. In this case, the different conditions in the examined and experimental events, namely, the unexpected appearance of an obstacle and the anticipation of an obstacle, were of decisive significance.

Participants in an experiment should be informed of the essence of the tests involved in the most general form. This concerns an investigation experiment for ascertaining the possibility of observing and perceiving a given fact or phenomenon, when anticipation of that fact or phenomenon would play a substantial role for completeness of perception, e.g., an experiment for ascertaining audibility. The same should also be done in performing an experiment designed to establish the possibility of an action, if that action is to occur suddenly (for example, the feasibility of suddenly stopping a vehicle in some specific conditions).

In conducting other types of investigation experiments, knowledge by participants of their contents would normally not affect the results; however, the investigator should take into consideration to what extent this knowledge could affect the participants' behaviour.

In instructing them, the investigator must not simply inform the participants of the purposes of a given element of the experiment, but should tell each where he should be at all the stages of the experiment, what actions and at what signal he should perform and clarify what means of communication are to be used among all.

In practice, there are cases when an experiment could be

performed with the participation of animals and even insects. In one case goods were stolen from a village shop. In inspecting the scene of the incident, the investigator discovered that all the door locks were intact, but the ceiling had an opening covered with cobweb. Meanwhile, the shop manager declared that the burglary could only have been committed through that opening, since all the windows, doors and door bolts were undamaged. Quite naturally the investigator turned his attention to the cobweb and assumed a poorly feigned burglary planned long before the police were called.

By conducting an investigation experiment during which the cobweb was removed, the investigator established that an adult could not have entered through the opening, for it was too small. And this convinced him even more that the burglary was feigned.

Several days after the inquiry was started, the investigator visited the shop once again. When he by chance lifted his eyes to the ceiling, he saw the opening was again covered with cobweb. This made him wonder whether it may have been covered with cobweb during the time that had elapsed from the moment of the burglary to the inspection of the site, i.e., during 15-17 hours. He then conducted one more experiment involving a spider. He carefully (so as not to frighten the spider) removed the cobweb, made all those present leave the shop and sealed the door. Now the spider had ideal working conditions. Every two or three hours, the participants in the experiment would enter the shop to check on the insect's work. Twelve hours passed, and the opening was again covered with cobweb. This confirmed the investigator's hypothesis about the spider's participation in the case. Later it was established that the culprit was a teenager who had easily entered through a small hole he himself made in the shop ceiling whilst sitting in the attic, into which he had entered through a window.

A court in Böblingen, West Germany, conducted an experiment with an unusual participant. One lady customer in a self-service shop was accused of stealing three tins of cat food. During the court proceedings, she admitted she really did have three such tins in her bag when she entered the shop, but denied stealing them, saying she had purchased them in that very shop the day before. She also said she had brought them with

her because her cat would not eat the product, and she decided to return the lot.

Neither the prosecution, nor defence had witnesses in court; so the justice summoned the cat. When he arrived, they put an open tin before him, but on sniffing the content he hissed, shook his head, and jumped aside. The justice declared that the cat's behaviour fully confirmed his owner's testimony, and the lady was acquitted.

All preparatory measures must be reflected in the investigation experiment plan. In complicated experiments involving numerous participants and diverse tests, it would be advisable for the investigator to draw up a written plan, which would, as a rule, be arbitrary in form but essentially reflect all the points mentioned above in listing such preliminaries.

3. EXPERIMENTAL TACTICS

An analysis of the practice of investigation experiments leads to the following tactical conditions:

(a) limited number of participants;

(b) surroundings maximally similar to those in which a given event took place;

(c) multiple repetition of the same test;

(d) performance of tests in several stages.

The first condition emphasises that only really needed persons should be invited to take part in the experiment. In this case, the investigator should bear in mind that too many participants would complicate the experiment and imperil the secrecy of its results.

The second tactical condition reflects the importance of ensuring that experimentally performed actions should be as similar as possible to those investigated, both in essence and with regard to surroundings and other decisive factors. This condition is provided for by a whole series of tactical techniques. Given their importance, let us now analyse the essence of each technique in detail.

Conducting an experiment at similar time of day. This technique should be used without fail when the timing of an experiment has substantial significance for the nature and degree of authenticity of possible experimental results.

An experimental action need not necessarily be always performed at the same time of day as when the actual, investigated event took place. For example, checking the possibility of entering through a gap or removing a definite object through it would usually be irrelevant to the time at which the experiment was being performed. However, if its results depend on daylight intensity or on the position of the sun or moon, or on some similar factor determined by the time of day, sunrise, sunset, the lunar phase, etc., the experiment must be performed at the same time as the investigated event.

Performing an experiment at the same site where the investigated event occurred. This tactical technique is used when it is necessary to attain maximum similarity of conditions characterising the experimental and investigated events. However, it would be inapplicable in the following cases: (1) if the site of the actual event has ceased to exist, e.g., if a house was destroyed by fire, new buildings were erected on vacant land, and so on; (2) if there is a need to perform a laboratory test to make the experimental investigation complete; and (3) if the site of an experiment cannot affect its results.

At about midnight, R., a woman residing in Leningrad, went out to mail a letter, leaving her flat unlocked. At that time, B., a man who lived next door, was passing along the staircase. He took advantage of her oversight, entered the flat, took her coat from the hanger in the corridor and hid it in his kitchen. Afterwards, he once again entered the corridor of her flat, lifted the curtain covering the clothes on the hanger, and tried to take off another coat. But at that very moment, R. returned home to catch him redhanded.

During a preliminary investigation, B. denied the theft and testified he had entered R.'s flat quite accidentally. When brought face to face with R., he declared her testimony was fictitious, and when she was ascending the staircase she could see neither his exact position in the corridor nor what the was doing.

To check R.'s testimony, the investigator performed an experiment. Specially summoned witnesses were placed where, according to R., she was standing when she saw B. by the light of an electric lamp burning on the landing, and B. was placed in the corridor of her flat near the hanger. By the light falling

into the corridor from the landing, one could well see what B. was doing from the spot where R. was during the event. The results of the experiment proved so convincing that B. was forced to plead guilty of burglary.

Similarity of climatic conditions of actual and experimental events. Climatic conditions affect the results of an experiment in those instances when the degree of visibility and audibility of an experimental phenomenon and/or its duration could depend on air temperature and humidity, wind force and direction, and other similar factors. For example, fog, snow and rain would affect the horizontal visibility zone; the height and nature of clouds would determine the extent of vertical visibility; a head wind would slow the motion speed of humans and vehicles despite equal expenditure of effort; and temperature conditions would influence the work of mechanisms and the time during which criminal traces would remain intact.

In conducting an investigation experiment, one must take into account not only the climatic conditions that prevailed during various tests, but also those existing prior to them, given all that could influence the results of investigatory actions.

At one railway station in the Trans-Caucasus, a local shop guard was assaulted by bandits. During a subsequent investigation, the police found a woman witness who testified she observed the crime from a window of a freight car converted for lodging (the car was railed at about 150 metres from the scene of the attack). The crime was committed at about 3.00 a.m.; there was no moon, and the sky was full of low clouds. At the site of the assault, light was partially falling from the railway searchlight; however, the assailants and their victim were in the shadow. The witness declared she could not discern the criminals' faces, but that their silhouettes were distinctly visible.

The testimony of this sole witness was very important in the case, but it evoked doubt: it was difficult to believe that in the given conditions the woman could have discerned anything at such a considerable distance. The investigator performed an experiment for visibility. He chose a moment when the cloud level was the same as on the night of the crime, and, with a searchlight switched on, placed two persons at the scene of the attack and told the woman to describe their actions. Howev-

er, neither she, nor the witnesses who stood beside her could see anything.

In assessing the results of the experiment, the investigator noticed that, prior to the assault, it had not rained for many days, whereas on the eve of the experiment it did, and the soil was moist and dark. He then repeated the experiment in dry weather, and the result was the opposite: against a background of light dry soil, the people's silhouettes and motions were clearly visible.

Obviously, in this case, the significant factor was the similarity of not only the climatic conditions in the investigated and experimental events, but of those that preceded them.

Conducting experiments under artificial lighting identical to that used in the actual event. This tactical technique is closely related with the ones mentioned above, for its purpose is to ensure similar visibility conditions. In this case, the important thing is to use in the experiment sources of artificial lighting similar to those used in the actual event, and to arrange those sources where they were originally located, not to provide natural illumination of different objects at the site of the experiment.

Reconstructing surroundings for subsequent experiments. This is necessary for experiments to be conducted in conditions maximally similar to those in which the investigated event occurred.

Reconstructing the surroundings implies arranging of objects at the scene of the experiment in the same order in which they were at the moment of the event. Reconstruction of surroundings should be distinguished from experimental repetition of the event itself. In reconstructing surroundings, we do not perform any experiment, but simply create the conditions for conducting it.

The extent to which surroundings are reconstructed depends, first, on the availability of necessary objects; second, on the state of the site where the experiment is to be conducted; and, third, on the essence of the experiments themselves.

The general rule is that the genuine objects from the scene of the crime should be used to reconstruct the surroundings. In some cases, only objects similar to the original ones are used to reconstruct the scene or the boundaries of the experimental site, designated in a relative manner.

Using original or similar objects. Apart from the objects needed to reconstruct the surroundings, the experiment might require objects which were used during the actual event or those that resemble them.

Normally, the quantity and quality of objects to be used in an experiment would be known. But when the investigator does not know the number of objects he needs, this could in itself become a problem to be solved in the experiment (provided the quality of the objects is known).

To cite an example, one Soviet militia station got word that a shop director and a vegetable warehouse manager had colluded to sell potatoes with fake invoices. According to the agreement, the warehouse manager signed five copies of invoices permitting him to take out 1,100 kg of potatoes, but in the fifth copy of the invoice accompanying the produce he indicated 4,100, not 1,100 kg. Then the lorry was loaded with 4,100 kg for delivery to the shop.

The police arrived in the shop just in time to seize the fake invoices and find the potatoes. The thieves claimed a mistake had been made in the invoice, and that in reality the warehouse had supplied them with 1,100 kg, not 4,100 kg, as indicated in one of the copies.

This had to be checked. However, it would have been pointless to take an inventory of the shop since potatoes arrived there daily but were not regularly checked against the invoices. On the other hand, it would be unfeasible to take an inventory at the warehouse since reweighing the available potatoes would take so much time and effort as to be unprofitable for such a small amount as 4,100 kg.

Two loaders and two servicemen loaded the potatoes at the warehouse and two warehouse workers witnessed this. But all six witnesses testified differently about the amount (volume) of potatoes loaded onto the lorry. To establish the actual amount of potatoes taken from the warehouse, the investigator conducted an experiment.

The first test was performed with the participation of the two loaders. According to their indications, the lorry was loaded to the same capacity as when the potatoes were taken to the shop. Then the loaded potatoes were weighed to show 4,150 kg.

The second test was performed with the participation of the

two servicemen and two warehouse workers. After being unloaded following the first test, the lorry was reloaded from a hopper to the same capacity as indicated by the servicemen, and later by the warehouse workers. When weighed, the load amounted to about 4,000 kg.

The third test was performed with the participation of the thieves themselves, who continued to insist on 1,100 kg. When this amount was weighed and loaded onto the lorry, it turned out that the scattered potatoes were totally invisible from the latticed lorry side, whereas all the witnesses had insisted that the potatoes were loaded higher than the body sides. Moreover, if the potatoes were to be shoved to the front, they occupied only about one-quarter of the body capacity, and this also contradicted the witnesses' testimonies.

Performing experiments at the same speed as that of the actual event. It is important that the experimental event take place at the same speed as the actual event, particularly in cases involving traffic accidents, when the investigator must examine something related to a car's travelling speed, e.g., braking distance, etc.

Checking similarity of sound conditions, viz., nature, tone and intensity of noise, etc. Both the actual and experimental event take place in specific sound conditions, which are determined by the time, place and essence of the experiment. Naturally, in seeking to provide maximum similarity of experimental conditions with those of the actual event, one must also take into account the similarity of sound conditions, especially when they might affect the experimental results, e.g., when trying to establish whether the sound is audible or not. In this case, one must take into account that at night, for instance, sounds are more audible than in the day; that overground subway lines might lie near the site of the experiment; or that the street might go uphill thus compelling car drivers to switch to first or second gear, making the engine noise louder. One such experiment performed in 1906 produced incorrect results precisely because the investigators failed to take into consideration the noise produced by a train speeding past the hotel where the experiment was being conducted.

Creating similar sound conditions in conducting an investigation experiment is sometimes complicated in urban areas. Usual-

ly one can only eliminate excess sources of big noises and perform the experiment at a similar time of the day, i.e., when urban noises are as loud as they were during the investigated event.

Taking into account changed and unreconstructible conditions. The investigator can not always achieve maximum similarity between the experimental conditions and those characteristic of the investigated event. Furthermore, this similarity is sometimes highly relative. For instance, there might be a need to experimentally establish the combustion rate of some object. However, since the object itself has burned up, the investigator cannot make use of it in the experiment. But even when one cannot find an exact duplicate an experiment might still be feasible. In this case, in assessing its results, the investigator must take into account the degree to which the experimental conditions and those of the actual event do not coincide owing to circumstances over which the investigator has no control.

The third tactical condition is that identical tests should be repeated several times in the course of an investigation experiment.

The need to repeatedly conduct the same experiment is dictated by the objectives of a given experimental investigation. Repeated performance of the same test in a given experiment would make it possible to study the investigated event more thoroughly and certify that the obtained results are not accidental. Yet, this is not the only way to achieve this result. Sometimes, for greater clarity and conclusiveness, it would be advisable, in addition to conventional tests, to perform experiments in intentionally changed conditions to verify the results as authentic. By obtaining in changed conditions results that corroborate those of previous experiments, the investigator would make the latter even more convincing, and this would be particularly valuable in conducting experiments for verifying and assessing different versions.

When changed, experimental conditions might become either more complicated or simplified. In the former case, the investigator would intentionally make it more difficult to obtain results similar to ones already achieved, and in the latter case, this task would be facilitated. Experimental conditions would usually be complicated when verifying versions, i.e., when there

is a need to establish that, in the changed conditions, too, a fact may be explained from the viewpoint of a suggested version. Intentional simplification of experimental conditions produces very convincing results in checking testimonies by the accused about the circumstances of an event.

A shop was burgled. In inspecting the site of the crime, the investigator found one pair of window shutters open and the metal lock-plate hanging on one bolt. The second bolt had its plate-securing cap cut off. The plate had neither scratches nor marks indicating the use of a tool with which the cap might have been cut off: there were no filings either on the ground below the shutters or on the shop walls.

To see whether the cap could have been cut off at night without scratching the secured plate, the investigator asked a turner to make a bolt similar in size and shape to the damaged one, then put the plate onto the shutters and secured them with the newly-made bolt. Afterwards, he made experimental cuts.

During the experiment, it became perfectly clear that it was impossible to cut off the bolt cap without touching the plate. Then the investigator changed the experimental conditions by trying to cut it off during the day, in good lighting. But, even then the plate was scratched. Finally, he had two men tightly press the plate to the shutters and a third cut the bolt while drawing it back. Still, the hack-saw blade would inevitably scratch the plate. Thus, the consecutive simplification of experimental conditions clearly confirmed that the initially obtained result was correct, and made it even more convincing. It became obvious that the bolt had been cut prior to securing the plate: the burglary was feigned.

When we speak of repeated experiments, we mean repetition of the same test. If several tests are performed in the course of an experiment, each of them only once, such tests cannot be termed repeated.

The fourth tactical condition to be considered in performing an investigation experiment is that tests may be conducted in several stages to facilitate analysis, perception and recording. This makes it possible to observe an experimental event in all its phases.

Tests may be divided into stages in a relative (mental) way when the speed of actions cannot be slowed down. This divi-

sion into stages would occur in a situation in which, with repeated identical tests, the investigator would be studying consecutively one stage after another or, in other words, only one of the test elements, thus making it possible for him to get an idea of the whole experimental event.

Tests may actually be divided when the test speed does not affect the final result and when, in each stage, the test may be stopped for some time to record the obtained evidence.

On completing all the preliminaries and obtaining the main tactical conditions that will ensure the effectiveness of the experiment, the investigator tells the participants to take their respective places and signals the beginning of the experiment. At his signal, the participants in the experiment perform definite actions. The test is repeated several times, if need be, and the investigator records the results, both in the course of the tests and after they are over.

Such is the general scheme of an experiment. Naturally, every specific case has its own peculiarities, and these determine the arrangement of the participants, the system of signals, etc.

An experiment may be especially effective in exposing various imitations of crimes. Café manager B. told the militia that money, wine and food products had been stolen from his establishment. He claimed that the burglars had entered through a shuttered window, whose shutters were closed with a cross-bar. B. said that during the burglary he was in his flat (the thief occurred at night) located in the same building and separated by a wall.

When inspecting the site of the burglary, the militia discovered that the cross-bar had been cut with a hack-saw. The window through which the burglars had allegedly entered the café led from the street into a storeroom and was blocked up with a stack of cases from the storeroom side. The café manager alleged the burglars had not disturbed the stack order.

The inspection gave some grounds to suspect a feigned burglary. To check this version, the investigator carried out two experiments. An experiment for audibility showed that the sound produced by the hack-saw when cutting the cross-bar was distinctly heard in the manager's room. The second experiment established that only a child could have entered the café through the storeroom window. But in that case, he would have had

to knock down the stacked cases, and when they fell the noise would have attracted the manager's attention. The results of these experiments helped expose B. in feigning the burglary.

An experiment serves not only to expose false evidence but also to confirm true testimony and establish the criminal's actual guilt.

M. and B. were accused of buying ladies' shoes in Tbilisi, Georgia, and bringing them to Moscow for sale at excessive prices. In other words, they were accused of profiteering.

During a preliminary investigation, both men first declared they had bought the merchandise at the Tbilisi market; but then they changed their testimonies and began to assert they had made the shoes themselves. Yet, neither the investigator, nor the court took this into consideration, and both were sentenced to long prison terms.

In their appeals, the two men insisted the court had failed to check all the circumstances of their case, especially those testifying to their professional skills as shoemakers. The defendants also claimed that the jury had not examined the material evidence, i.e., the twenty-five pairs of shoes taken from the defendants. They maintained that they could point out those features of the shoes that would have been familiar only to someone who had made them.

The Board for Criminal Cases, Moscow Municipal Court, having recognised the arguments in the appeals as sound, repealed the sentence, and returned the case for reconsideration. In its decision, the Moscow Municipal Court also underlined the need to examine in court whether the two men could have made the shoes themselves. At a later session, the defendants described in detail all the marks of the material from which the shoes were made and also details of the shoe design. The court examined a ripped up shoe to check the marks indicated by the defendants. A shoe industry expert present in court confirmed that the shoe marks coincided with those indicated by the defendants, with the exception of some insignificant details. Based on this information, he concluded that it was two men (M. and B.) who had made the shoes.

However, the court did not limit itself to the expert opinion. They carried out an experiment in which the defendants made one shoe each on the spot. As a result, they confirmed, first,

that the defendants really did have the necessary skills and, second, that the marks on the shoes made during the experiment coincided with those characteristic of the footwear taken from them earlier, thus making it reasonable to infer that the latter were made by the defendants. In this way, the court established that no profiteering was involved and, hence, the penalty should be less severe.

4. ASSESSING THE RESULTS OF AN INVESTIGATION EXPERIMENT

To determine the authenticity and probability of the investigator's and court's conclusions in investigating the circumstances of a given case and in establishing the objective truth it is necessary to assess the results of an investigation experiment.

Here one must distinguish the authenticity of experimental results and that of the inferences drawn by the investigator and court from the experimental results. In the first case, the question concerns the correctness of the results of the experiment itself, meaning that the recorded experimental result really did take place and that it would have inevitably occurred in carrying out the given experiment in the given conditions.

One can say experimental results are authentic only when all the tests lead to the same result, which, in given conditions, is necessary, not accidental. For example, in carrying out an investigation experiment to check the audibility of a given sound, the results would be authentic only when, in all the tests, the reproduced sound would in the given conditions be audible (or inaudible) in a given place. However, if some of the tests performed in the given conditions lead to one result, and others to another, the experimental results cannot be recognised as authentic; they would be accidental.

As has already been mentioned, the authenticity of experimental results should be distinguished from authenticity of the conclusions to which the investigator and the court would arrive in assessing the results of their tests.

The results of an investigation experiment should be regarded only in totality with other materials of a given criminal case. In fact, their role is either to confirm or reject the investigator's supposition, or serve themselves as a foundation for a new hy-

pothesis concerning some fact or phenomenon. In order for experimental results to serve as a foundation for confirming or rejecting a version, the conclusions drawn therefrom by the investigator or court must be authentic, i.e., veritable so as to reflect an objectively existing reality. When experimental results serve as a basis for advancing a new version, a new supposition about some fact or phenomenon, the conclusions drawn therefrom may be both authentic and probable. To examine these tenets in detail, let us first dwell on the concepts of authenticity and probability in criminal proceedings.

Authenticity in criminal proceedings implies that the investigator's and court's conclusions fully correspond to objective reality, i.e., that, in a given case, the truth has been established to ensure the *only* correct decision. On the other hand, probability always implies only a *supposition* or possibility. Moreover, this supposition does not cease to be such even if it possesses the highest degree of probability; hence, it does not exclude a directly opposite assumption.

The distinction between authenticity and probability explains why inferences drawn from experimental results could serve to confirm or reject versions only when they are authentic. Naturally, a supposition cannot be used to check and assess another supposition that may be recognised as true or false only if based on truthful and authentically established facts.

In cases when conclusions drawn from experimental results serve as foundations for advancing certain suppositions, they could be both authentic and probable, since the availability of essentially probable evidence would not be an obstacle to advancing investigatory versions. For example, the results of an investigation experiment established that a man climbing out of the window of the room of victim M. was visible from N.'s room in given conditions (lighting, open window in N.'s room, N.'s position at not more than 2 m from the window, etc.). The result of this experiment would, therefore, be authentic.

However, based on this essentially authentic experimental result, the investigator might draw both authentic and probable conclusions. An authentic conclusion would be that N., when in his room, *might* have seen, in these conditions, a man climbing out of M.'s window. A probable conclusion would be that N. *really did see* that man. Yet, both the authentic and probable

conclusions may serve as a foundation for advancing the version that N. was informed of a circumstance that was significant in the case. Thus, the probable nature of a conclusion from the results of an investigation experiment would not prevent the investigator or court from advancing a supposition.

The authenticity of the conclusions drawn by the investigator or court from experimental results would, in the first place, depend on the authenticity of the results themselves. If some tests lead to one result, and others to another, no authentic conclusion may be drawn from such results.

The authenticity of conclusions based on experimental results also depends on the degree to which the conditions in which the experiment was conducted are similar to those of the actual event.

With regard to some investigation experiments, the authenticity of conclusions based on their results is virtually a question of whether the results of the tests are of any value as evidence. From this point of view, all investigation experiments may be classified into two groups: (a) experiments that serve to establish the possibility or impossibility of a given fact or phenomenon (possibility to observe and perceive an event or phenomenon; possibility to perform a given action; and/or possibility that a given phenomenon exists) and (b) those with which the essence of the fact itself or the process of its origination are established.

In carrying out experiments belonging to group (a), to assert *possibility* would mean that a given fact or phenomenon might have taken place when an investigated event took place, since that fact or phenomenon did take place during the experiment. For example, an experiment had established that an adult could have entered a shop through an opening in the ceiling. This also means that, during the burglary which is being investigated an adult might have entered the shop via that opening. However, this would not yet indicate that the burglary was really perpetrated by adults and not teenagers.

If an experiment established that a shot fired in the backyard of a house was heard in the room where the witness lived, this would mean he might have heard it; however, it would not prove that he actually did hear the shot.

Thus, to establish possibility does not yet mean to establish

reality. By deciding that a witness *might* have seen a given fact, the investigator could not yet assert that he *must have* seen it or had actually seen it.

Hence, to establish the possibility of a given fact means to infer its *probability*; however, this does not make it possible to assert categorically that the fact actually took place during the investigated event.

To make a negative decision, i.e., to assert to *impossibility* of a given fact or phenomenon means it would have been impossible during the investigated event, provided the experimental results are authentic. For instance, if an experiment established the impossibility of an adult entering a room through an opening discovered by the investigator in a shop ceiling, this would mean that in committing burglary no adult had climbed through that opening. Again, if an experiment established that a shot fired in the backyard was not audible in the witness' room, one may conclude that the witness in that room really did not hear it.

Thus, if a negative experimental result is authentic, it would be categorical and would make it possible to draw an authentic conclusion, not a probable one.

In carrying out group (b) experiments, the investigator must decide how a given event took place or how its traces were formed. As in group (a), conclusions drawn from experimental results could be both probable and authentic.

If an experiment established that a given event could have taken place *specifically in this way and in no other,* or *specifically not in this way, but in any other,* the conclusions from such experimental results would be categorical and authentic.

A group of people took a car and went hunting. They spent the night in a village cottage, got up at four in the morning and began packing their belongings. Meanwhile the two hunters and the driver went to the jeep. While the driver was checking the engine, a shot was fired and killed one of the hunters. The other claimed that the victim had shot himself when putting away his gun in the jeep. A subsequent investigation experiment conducted to determine the mechanism of the event, specifically the victim's posture during the shot established that, judging by the direction of the path travelled by the bullet, the car's position and other circumstances, the victim was not wound-

ed when putting away his gun. Thus, experimental results made it possible to categorically infer that the second hunter had given false evidence.

However, in cases when an experiment would only establish the *possibility* of an event having taken place in a definite way, the conclusions drawn from experimental results would be only probable, since the possibility of an event taking place exactly that way would not exclude that it could have occurred differently and one cannot assert that it took place in that particular way.

True enough, the evidential value of probable and authentic conclusions drawn from experimental results always differs. Yet, in recognising the indisputable evidential power of only categorically authentic conclusions, one nonetheless cannot regard probable inferences as useless. Such conclusions encourage the investigator to search for other ways of verifying evidence and help him to take the correct line of action in investigating the actual event.

5.RECORDING THE COURSE AND RESULTS OF INVESTIGATION EXPERIMENT

The course and results of an investigation experiment should be procedurally recorded so that they can take their proper place among the other materials of a criminal case.

To record the results of an experiment, the investigator draws up a record, makes plans and maps and uses photography, filming and video recording.

The investigation experiment record is the main procedural document reflecting the experimental work of the investigator in a given criminal case. It figures in the file as the principal source of information about the conditions, sequence, essence and results of the respective tests.

For the record to correspond to its purpose, it must satisfy the following requirements:

1. It must be drawn up exclusively by the investigator. Other participants in the experiment, including experts, have no right to do that.

2. It must contain descriptions only of those actions that were performed during the experiment, and those descriptions must correspond to reality. It must also contain exhaustive descrip-

tions of all tests and their results. The sequence of these descriptions should correspond to that of the experimental work done. The record must include neither investigation versions nor those conclusions from the experimental results that would be drawn by the investigator for further work in the given criminal case, hence the rule that the record must be invariably drawn up at the site of the tests and immediately after their completion. This will ensure accurate and exhaustive description.

3. The record shall be correctly formalised, i.e., contain all the essential elements inherent in this type of document. Also, it shall be signed by all the participants in the experiment.

Apart from the record, which is the basic means of recording the course and results of an investigation experiment, the investigator shall also use *plans, maps, photography, filming and video recording,* all of which will be particularly effective when the experiment involves certain actions.

Plans, maps, photographic pictures, cine and video stills may be used as additional means of recording an experiment, and their main purpose is to illustrate the record.

Plans and maps are made only when there is a need to graphically record either the environment or the positions of the participants before the experiment starts, during or after the tests. Plans should be made in accord with general rules for making similar documents and contain the following elements: name, date, conventional symbols, scale, the four cardinal points and signatures of the investigator and witnesses. Normally, other participants would not affix their signatures.

Photography, filming and video recording are performed in several stages. To begin with, it is advisable to record the general view of the site of the investigation experiment (before the surroundings were reconstructed for the experiment). The second stage involves photography of the environment in which the experiment is being conducted. In the third stage, the investigator records the tests involved, and in the final stage, the results and the environment in which they were obtained.

In addition to the usual black-and-white photography, colour photography and stereophotography involving the use of both conventional and colour photographic materials might also be highly effective.

Chapter 12

SEARCH

1. THE CONCEPTS OF SEARCH AND SEIZURE

Essentially designed to reveal material evidence, the search is one of the most effective means of investigating a crime.

When described by detective story writers, the search usually appears to be one of the most exciting elements in the work of an investigator or operative. The sleuth enters the room, with his supernatural intuition, pensively looks over the surroundings and determinedly marches to the corner. He then touches the floor with his sensitive fingers, and a board springs up, as if on its own, to reveal a hidden cache. Naturally the detective discovers a false bottom in a suitcase or a diamond in the cavity of a rotten tooth just like that. In fact, he does everything so easily and adroitly that one could hardly imagine that the search is, first of all, a fatiguing and sometimes very lengthy job, an exhausting nervous strain that increases as fewer places remain to be examined and the object in question is still missing. Searching involves the need to suppress the natural distaste to look for hidden things in, to put it mildly, disgusting places; the need for constant readiness to repel a possible assault when the person looked for is a criminal suspect. This description could be continued, but perhaps what has been said is enough to convey the understanding that the search is not all that romantic.

In criminalistics, the *search* is understood to be the compulsory inspection of premises, structures, localities and individuals in order to find and remove objects that have significance in a given case and also to detect wanted persons.

Persons or institution may be ordered to surrender definite items and/or documents of significance in a case. This is known as *seizure*. In fact, a search would normally be started by de-

manding those things, and further action would follow in case of refusal to comply.

Inasmuch as search and seizure to some extent infringe upon the individual's right to be secure in his person and household, it is necessary to obtain special permission (approval) by the public prosecutor in charge of supervising the observance of legal norms in the course of the investigation. In urgent cases, that approval may be obtained after the search and seizure; however, even then, it is imperative that permission be obtained to ensure the legitimacy of search and seizure.

The objectives of search and seizure are, first of all, to find and remove material evidence, i.e., criminal tools, such as master keys and other similar implements, counterfeit money, and weapons; objects of criminal action, e.g., stolen goods, money, valuables, etc.; items with traces left by the criminal action, e.g., clothes with bloodstains, labels from stolen goods, etc.; means of concealing crimes, e.g., fake identification cards, suitcases with false bottoms etc.; and, finally, all other objects and documents which by virtue of their qualities and relation to the crime, might help to establish specific relevant circumstances.

A search may also be aimed at finding a wanted person or seeking information that could lead to his arrest. It may also be performed when a criminal has already been detained or arrested. Finally, another important task in a search is to look for and possibly confiscate property that could compensate for damages done by some crime.

A search and seizure are performed only when the proceedings are instituted and only on sufficient grounds.

2. PREPARING FOR SEARCH

To organise a successful search, one must have at least minimal information about the object. If a search is to be conducted on open ground, one should first study the site, its boundaries, terrain, vegetation, and buildings and objects located there. In preparing for a search in a building, it is necessary to establish its exact address, location and layout, and also determine its residents, furniture, if any, and so on.

Correct timing of the search is also important. The investi-

gator must decide what moment in the inquiry would be most appropriate for a search and then determine the optimal time of the day. With the exception of urgent cases, Soviet law stipulates that searches be conducted in daytime only. Soviet criminalists recommend selecting the day and hour when the sought objects would most probably be found at the place of search; when access to the site is easiest; when conditions for conducting the search are most favourable and, conversely, when counteractions by interested persons would be most unlikely.

An investigator or operative must not conduct a search alone. The procedure shall involve witnesses (strangers who are invited to observe what the investigator is doing); the person searched or adult members of his family, or, in their absence, a representative of the local authorities; or representatives of the organisation in which search is being conducted. All these are compulsory participants in the search. Besides, the investigator may invite a criminalist, forensic physician, diver, chimney-sweep, and so on, and also the victim and the accused, if he is not the person being searched.

In conducting a search, the investigator or operative might need various technical devices. These would have to be prepared beforehand. A prober in the form of a sharpened metal rod is the simplest and most widely used device for piercing the ground and prodding soft furniture. Various kinds of metal detectors are used to search for small metal objects, and different types of X-ray apparatuses may also be quite useful.

It has long been noted that the behaviour of some domestic and wild animals, birds and insects may serve as a guide in searches. For instance, even fireflies could be helpful in detecting narcotics. Entomologists have found fireflies to be very sensitive to certain chemical compounds contained in heroin; they begin to glow if they sense it nearby. Even a very slight concentration of a narcotic will suffice for the insect to glow. New York policemen are already trying to make use of the firefly to catch drug traffickers.

Sometimes the sought objects make themselves known. A criminalistic journal published the following report from Austria. One evening, two theatre spectators went behind the scenes after the play was over. They introduced themselves to the actors as radio reporters, and asked for a short interview. One of the

first to agree was a young actor who had a small role in the play. The reporters switched on a small apparatus which looked like a tape-recorder, but was actually a UV-ray device. All of a sudden, the actor's costume, hands and hair began to glow under invisible UV rays. At the same time, a pair of hands gripped his shoulders and a quiet voice told him he was under arrest.

In this way, the two "radio reporters", who were actually policemen, detained a thief who every evening used to steal several shillings from the theatre cash box. When other ways to uncover the criminal had failed, the police treated several banknotes with chemicals that would glow under ultraviolet rays. The "interview" was taken in the evening when the marked money was stolen.

3. SEARCH TACTICS

A search on open ground or in a building generally begins with a general survey followed by a more detailed inspection.

In a way, a search is a kind of exam whereby the investigator tests his keenness of observation, quickness of wit and resourcefulness. The problems he faces vary considerably with each given situation.

Auguste Dupin, the amateur detective in Edgar Poe's short story *The Purloined Letter,* found a letter in a minister's home which policemen had failed to find despite the fact that they had inspected literally every inch of the walls and floors, examined all the furniture and looked through all the books. The following passage shows how Dupin realised that the letter was not hidden, but on the contrary, was obvious and for that very reason a search could produce no results.

"There is a game of puzzles," he resumed, "which is played upon a map. One party playing requires another to find a given word—the name of town, river, state or empire—any word, in short, upon the motley and perplexed surface of the chart. A novice in the game generally seeks to embarrass his opponents by giving them the most minutely lettered names; but the adept selects such words as stretch, in large characters, from one end of the chart to the other. These, like the over-largely lettered signs and placards of the street, escape observation by dint of being excessively obvious; and here the physical oversight is precisely

analogous with the moral inapprehension by which the intellect suffers to pass unnoticed those considerations which are too obtrusively and too palpably self-evident... The minister had deposited the letter immediately beneath the nose of the whole world, by way of best preventing any portion of that world from perceiving it. ...The minister had resorted to the comprehensive and sagacious expedient of not attempting to conceal it at all."*

Dupin's guess proved correct: the letter was really lying in full view, and he found it easily. And even though this rule has long been well known to criminalists, sometimes people are apt to forget it. Three times the militia searched the flat of one big profiteer, all to no avail. After the fourth search, during which they also found nothing, the investigator, before leaving, decided to inspect an old tea tin lying under the stand in the passage among shoes and shoe brushes, and that is where he found a bundle of twenty-five savings-bank books with large deposits payable to the bearer. Undoubtedly, the officials responsible for the search must have kicked the tin several times, but paid no attention to it.

There is a Russian children's game called "cold-hot". One of the participants must look for a hidden object, while the rest comment his efforts by exclaiming "cold", "warmer", "still warmer", "hot", etc. When the searcher approaches the object he is "hotter", and vice versa. In a similar way, during a search, the searched person and the investigator become "players". The former does not yell "cold" or "hot" to the investigator, but his facial expression, gestures, postures, and state of mind would betray him anyway. He would persistently try to turn away his eyes from the bookcase in the corner, but the object would keep attracting his gaze, and the investigator would find among the books the documents he was looking for; or he might start fussing, trying to distract the investigator's attention from a dust bin, where in fact, his gun is located, wrapped in a rag. It is imperative in a search to monitor the behaviour of the person undergoing the search.

A. was suspected of killing his mother-in-law. The militia as-

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* E.A. Poe, Op. cit., pp. 98-99.

sumed her body was buried in the suspect's vegetable plot, so they thoroughly searched it. At first, the suspect was surprisingly cooperative in helping them dig up the ground and even transported the excavated earth in a wheelbarrow to one specific site; as a result, a rather large mound formed there.

The search continued almost the whole day, but all in vain. It was already evening when the investigator noticed the mound A. had piled up. He wondered why A. had dumped all the dirt in just one place and decided to dig in that very spot. But A. flatly refused to take part in the work saying he was tired; he also became noticeably nervous. When the mound was scattered, it was found to cover up an old cesspool, in which the militia found the body.

In another case, the militia searched a suspect's flat and garden planted with currants, but found nothing. When the suspect was being taken out of the garden, he said goodbye to his wife and, as the investigator noted, furtively showed her four fingers and a bent thumb. The investigator immediately recontinued the search digging up the ground under every fourth currant shrub starting from the end of the garden. His assumption proved correct: under the very first shrub he discovered a metal box with a large sum of money.

In their desire to conceal stolen valuables, money and/or criminal tools, criminals will resort to almost anything. Once, a team of operatives came to search Ch.'s house; the man was accused of burgling the local village shop. In the room, they found his mother, a senile lady, who he said was about to die, lying on a cluttered-up bed.

During the search, one of the operatives noticed the old woman would occasionally cast guarded looks at the searchers, and then close her eyes. The searchers also noted that when Ch's 8-9-year-old son approached her and started pulling at her, the man roughly grabbed the boy and literally threw him aside, explaining to the operatives that a dying old woman should not be disturbed.

The search continued without result. When Ch. was told to carry his mother to another bed, he refused to comply and said it was out of the question to move her. Then the militia called out a physician, who stated after examining the allegedly dying old woman that she was perfectly healthy. The doctor had bare-

ly finished the examination when Ch. told the woman to "stop the acting" and get up. Under the mattress, the militia found a pistol and also eight watches which Ch. had stolen from the village shop.

Occasionally, the criminal might think that as the search continues without result, the investigator will grow tired and less attentive, and as a result, the concealed object will stay unrevealed. There was a case when an investigator was looking for documents in a room in which all the walls, from floor to ceiling, were lined with book shelves. After checking each of the several thousand books, he found the documents glued into the bindings of two books standing in the middle of the third shelf from the top and the second shelf from the bottom. The suspect explained that he thought that, in the event of a search, the investigator would look through the books in some definite order, either from top to bottom, or start with those books that were at the level of a stretched hand, and that each shelf would be checked consecutively from right or left. Based on these considerations, he hid the papers where he thought the investigator, by the time he reached them, would be tired or, perhaps, would have abandoned the search altogether.

A body search involves certain considerations. It is normally performed from the head downwards, special attention being paid to natural openings in the body. Such a search is performed by an individual of the same sex.

The body search is accompanied by inspection of suspect's clothes, footwear and other garments. The search begins with outer clothes and footwear, and finally the underwear, socks or stockings, and other accessories. The investigator feels through or unrips seams, if need be; detaches shoe heels; and checks whether the pockets have secret compartments. He may also rip away patches and check hollow metal buttons. Particular attention should be given to inspecting orthopaedic footwear, crutches, canes, umbrellas, etc. If the suspect wears a bandage, or a plaster cast, they could be removed by a physician.

A special record must be filled out about search and seizure of somebody's personal belongings. It must indicate by whom, on what grounds and in whose presence the search or seizure was performed and must list all discovered items and papers marking exactly where they were found. One copy of the re-

cord is either given to the suspect or left at the place of seizure.

To record the discovered items, the use of photography is advisable. When a search reveals caches, their pictures should also be appended to the file.

Chapter 13

PRESENTING SOMEONE OR SOMETHING FOR IDENTIFICATION

1. THE CONCEPT OF IDENTIFICATION. PRELIMINARIES

Presenting various objects for identification would be a frequently used investigation practice. The need to identify a given object may arise in investigating any crime, but most often murders, armed assaults, thefts, burglaries, indecent offences, and profiteering.

In one village cottage, the militia discovered the bodies of the elderly Biryukova and her grandson Yevgeny. Many items of clothes had disappeared. Biryukova's second grandson, five-year-old Nikolai, told the militia that the murderers of his grandmother and brother were two women who came to see them the day before and had stayed overnight.

When the investigator questioned Biryukova's fellow villagers, it turned out that on the eve of the murder two absolutely strange women had appeared in the village; they said they knew Biryukova and were looking for her house. Two witnesses, Savikova and Pronkina, remembered them especially well, since both strangers had warmed themselves in Savikova's house, and Pronkina had talked for a long time with them in the street. Both witnesses declared they could recognise the two unknown women; they described in detail their appearance, drawing the investigator's attention to the fact that the triangular kerchiefs they had on their heads were precisely those which, on the following day, they saw tied around the murdered Biryukova's neck.

Based on the distinctive marks described by the two witnesses, the militia started a search, which, however, gave no results for a long time... Only after more than eight years, a certain Chaplina was arrested on suspicion of this murder and burglary and pleaded guilty to the crime, giving evidence against Nikonova, her accomplice (who denied involvement in the killing). The investigator presented Nikonova among a group of other women for identification by Pronkina, and then, in Pron-

kina's absence, to Savikova. Both witnesses instantly recognised in Nikonova the unknown woman who, together with another woman, had appeared in the village on the eve of the murder and had shown interest in the Biryukovs. Also, independently of each other, both stated Nikonova had grown older. These convincing results were used as the basis of the sentence subsequently pronounced by court.

Human memory is, indeed, an amazing thing. For many years it can retain the image of a person met by chance and, once recalled, it arises in the mind with all its individual features, wrinkles and birthmarks. It can also record only some specific detail or feature, which, when seen again, would actuate a complex mechanism of associative ties and, from somewhere deep in the memory, something seemingly forgotten would crop up, say a conversation with that person while waiting for a bus under drizzling rain, and so on. Precisely these associative ties sometimes help reveal during identification many important circumstances in the investigated event.

In spring, after the snow had melted, the body of an unknown middle-aged woman was discovered on the outskirts of a small town twenty kilometres from a large Siberian city. The woman had been murdered. She had a wide incised wound on her throat and several stabs on her chest and left side. What immediately attracted special attention of the investigator were her fingers: they were long and tapered, and the nails were carefully trimmed and coated with bright red polish, thus leading him to think they had been done by a skilled manicurist. Also, from the state of the nails and polish, he inferred that the victim had had her nails done just before being murdered.

The first thing to do was to establish the victim's identity since the body had no papers on it. An examination of evidence on missing persons gave no results. Nor could the local residents or those of a nearby village identify the body. Nobody knew the woman, and nobody had ever met her in the vicinity.

Then the militia invited all the manicurists working in the city to the municipal morgue to which the corpse of the victim had been transferred. Eighteen excited women gathered in a small anteroom; they were brought in one by one to the room where the body was lying and asked to pay special attention to the fingers. Finally, the eleventh manicurist said she recognised

her own work and remembered these hands. She could not recall the woman's face, though; but, then, she apparently did not even look her in the face when doing her nails. However, when she recalled her hands, she also brought to mind the conversation they had. In fact, that conversation proved very important for the investigation. According to the manicurist, the woman had come from the Crimea, from a town where she owned a house. She said she had sold the house and wanted to come to live with her relatives (who were local residents) so as not to feel lonely.

The rest was easy to find out. Already on the next day, the investigator knew the victim's name, and one day later the name of her relatives, who incidentally had "failed" to identify the body. On the third day, the investigator was already listening to a dreadful confession by one of those relatives, who had actually murdered the woman to get hold of her money.

From these examples, it follows that the essence of identification is in establishing the identity of the presented object by its mental image, imprinted in the memory of the identifier.

The following types of identification are customary in investigation practice:

(a) identification of people;

(b) identification of dead bodies;

(c) identification of articles, criminal tools, documents and animals; and

(d) identification of localities, dwellings and other premises.

When it is impossible to present the real object, photographic image may be used, which must be shown together with other photographs of similar objects, all in all not less than three.

The efficacy of presenting an object for identification and the evidential significance of the results largely depend on the quality of the preliminaries taken for that action.

In the course of preparation, the investigator decides whether an identification is really necessary and advisable; creates suitable conditions and surroundings therefor, studies the objects to be identified; and questions the identifiers.

Identification is not advisable when the person to whom the given objects are to be shown cannot identify them because of his physical defects or poor health. Nor should the investigator perform this action when the objects to be identified have no

distinctly pronounced individual features that would render it possible to decide on their identity, or when these objects had undergone changes which had deprived them of those features. Neither would identification be performed when the person to be identified and the identifier know each other, i.e., when it has been established that they are acquainted, and when the investigator has no grounds to assume that the person to be identified is using an alias. It is not advisable to try to force someone to identify an object if he gives objective reasons for his inability to do so. However, when the investigator knows for certain that the identifier can identify a given object but refuses to do so, he should be forced to comply, since even a negative result would still have some evidential significance.

If, during an interrogation, the identifier cannot say for sure whether he would be able to identify a particular object, the investigator must decide upon the advisability of showing him that object, taking into consideration the case in question. The general rule would be that all objects, with the exception of human beings, should invariably be presented for identification, since even a negative result would not complicate the investigation. On the other hand, identification of people should be performed only when a negative result would not render the subsequent investigation difficult.

Before presenting an object for identification it is important to question the identifier. In the course of the interrogation, the investigator must establish the degree of perception of the identifier concerning the object to be identified, obtain as full a description of that object as possible and clarify ways for checking the results of the identification.

The following circumstances are necessary to achieve these objectives when questioning the identifier:

(1) When, in what conditions and how the identifier perceived the object to be identified in connection with an investigated event, and whether he had perceived that object before;

(2) Whether or not the identifier has any sensor or mental defects that might affect the nature and completeness of perception;

(3) Whether the questioned person could identify a given object if it were presented to him;

(4) The individual features of an object perceived at one

time by the identifier (the distinctive marks and specifics of that object);

(5) The evidence that could confirm the identifier's testimony on the individual marks of the object presented for identification.

In establishing these circumstances, the investigator should take into account the extent to which such factors as time of perception, degree of attentiveness, nervousness, fear, etc., may have influenced the perception of a given object by the identifier.

The extent to which the features of an object are perceived and remembered by the observer depend on his attitude toward the object, and also on the duration and remoteness of observation, his nervous and psychological condition, his profession and the type of object observed. An especially important factor is the observer's state of memory and his memory skills. One observer might have a developed logical memory, with which he would readily remember the content of a book, wordy texts and even whole poems. Another might possess a motor memory, with which he could reproduce motions, operations and/or gestures. Yet another may have a developed tactile or sensory memory, and the last an image memory.

In presenting an obect for identification the investigator must make use of the strong points of a witness' memory. Professional memory, with which an individual would better remember things connected with his profession, would be particularly valuable for identifying things and people.

During preliminary questioning of the identifier, the investigator should also keep in mind that some people, in reporting the distinctive marks of the object observed, will fill up gaps with imaginary details which they believe to be genuine ones. Hence, it is very important to check such evidence. If considerable time has passed from the moment of questioning to the moment when an object was presented for identification, the investigator should repeat the interrogation directly prior to identification. This is important in order to check the extent to which the marks of the object to be identified have been retained in the identifier's memory and to make a final decision concerning the advisability of presenting the object for identification.

Having elucidated through interrogation of the identifier the

conditions in which the latter perceived the object to be identified, the investigator should, if possible, have him identify the object in the same conditions, since worsened conditions might lead to nothing.

The object to be identified should be presented to the identifier among a group of similar objects (with the exception of dead bodies). This will ensure unbiased evidence by the identifier and, at the same time, make it possible to some degree to check the extent to which he perceives an object he previously perceived. Before conducting an identification objects are selected to be presented to the identifier together with the object to be identified.

2. THE TACTICS OF PRESENTING A SUBJECT FOR IDENTIFICATION

The identification of people is a most common type of identification. This involves the observance of certain rules.

1. The suspect should be presented in a group of at least three individuals. This is necessary to prevent the identifier from feeling pressure to identify a specific person.

The investigator should not simultaneously present several suspects to one identifier. Nor shall he present one person for simultaneous identification to several identifiers. In these cases testimony provided by one identifier may influence that of the other identifiers.

2. The suspect should, if possible, be dressed in the same or similar clothes that he wore when observed by the identifier. Persons in the group together with the suspect should also be dressed in clothes similar to the latter's clothes and should, as far as possible, resemble him. If the appearance of the suspect sharply differs from those of the rest of the group, the court might later question the results of such an identification.

3. Prior to presentation for identification, the identifier should not meet in the room where the identification is to be conducted either with the suspect or with the persons in his group. The presentation itself should be held in conditions that allow the identifier to carefully inspect the persons to be identified. Specifically, there is a need to provide the identifier with sufficient time for careful inspection of the persons to be identified; to

arrange the latter in definite postures and positions at his demand; to ensure that the conditions and surroundings be similar to those that existed at the moment when suspect was actually perceived by the identifier; to have suitable lighting; and so on.

The suspect should be given the opportunity to choose himself a place among other persons in his group.

When a witness testifies that he has never seen the suspect but has heard and remembered his speech and voice and could identify him thereby, the investigator should arrange for this type of identification.

In the dark, a victim might not see the criminals' faces or discern their distinctive marks; occasionally, he might even fail to determine their exact number. And that is exactly what happened at a small railway station where several thugs attacked a girl returning one night from work. One of them took off her watch; the other stole her coat and told her to get going before they kill her.

The victim failed to discern their faces in the dark, but remembered that the one who had stolen off her coat had a low, hoarse, commanding voice. The investigator decided to have the victim try to identify the man suspected of assailing her by his voice and speech. He had the suspect brought to the site of the event and speak to the girl at the same distance and in the same conditions as during the assault; the victim identified him.

The suspect to be identified by his voice and speech should be joined by several strangers, each of whom will be told to repeat sentences composed by the identifier. Afterwards, the investigator will ask the identifier to point out the person whose voice he recognised.

Identification by voice and speech should also be preceded by an interrogation of the identifier, who will be asked by what manner of voice and speech (timbre, strength, melodiousness, accent, lisping, stammering, burr, tempo, etc.) he will identify a given person.

Understanding the serious evidential significance of an identification, criminals, in preparing to perpetrate a crime, take measures to change their appearance. Once, the employees of a bank saw a man in a clown costume. He wore an artificial

beard and moustache, dark glasses, a lady's whig and green rubber gloves. His face was densely coated with the ceruse usually used by circus clowns. Inasmuch as his intentions were quite obvious, one employee switched on the alarm signal, and the "clown" made off. The policemen who arrived at the scene caught him several blocks away. While trying to escape, he had thrown off his masquerade dress and even managed to rub off most of the ceruse.

Presenting a corpse for identification. The corpse to be identified should be presented for identification to persons who, on the investigator's assumptions, knew the victim when he or she was alive.

When there are certain ideas regarding the victim's identity, and the number of people to whom the body is to be presented for identification are few, the investigator should question the identifiers in the usual way. However, sometimes there may be strangers who could identify a discovered corpse. Then the investigator may have to present it to a considerable number of people. For example, when a dead body is discovered in a forest, it should be shown to the residents of nearby villages and settlements. In this case, the investigator would not question all of them; however, if someone identified the body this person would subsequently be questioned in detail about the distinctive marks of the body and personal belongings that helped him do it.

When a dead body is found mutilated, the investigator will have to "clean it up", i.e., make it identifiable with the help of a forensic medic, prior to presenting it for identification.

If for some reason, a corpse cannot be identified prior to burial, its fingerprints should be taken and it should be photographed for distinctive marks (in addition to the usual photography that would be performed at the scene of the crime). They should also photograph specific marks on the corpse, the clothes and any articles found on it, and at the site where it was found. Sometimes the investigator will make a plaster deathmask. In future, all this evidence could be helpful in identifyng the corpse.

Presenting objects and animals for identification. Identification of various objects, such as criminal tools, documents, etc., and also of animals, could be helpful in establishing their owners.

both criminals and victims and/or witnesses. The following example shows the possible significance that the identification of articles might have in exposing a crime.

Once, a district militia station in Poznan, Poland, got word that some people had discovered in one of the flats in house No. 13 on Lampe Street the body of tenant Janus S. There were indications that the victim died a violent death.

The condition of the body, as well as other circumstances revealed during inspection of the scene of the crime, indicated that the man was killed at night about six days ago. The area around the body was in disorder, and the investigator assumed the murderer and victim had scuffled. Death resulted from manual strangulation.

Among other items, the investigator removed from the site of the crime a blue cloth jacket. He found the article in the wardrobe and, judging by its size, it could not belong to the murdered man.

Janus S. was 59, single and living on an income he received from selling antiques. The last time people had seen him was six days before at the Poznan Railway Terminal café in the company of a young man of about twenty, with whom he left the place a little after two in the morning.

Witnesses described the young man's distinctive marks, and some testified that Janus was wearing ruby-studded gold ring on his left hand. Incidentally, later the police failed to find the ring either on Janus' body or in his flat. Nor could they find in Poznan the young man with whom people had seen Janus. Subsequent measures aimed at identifying individuals who had handed in bloodstained clothes for dry cleaning or laundering also gave no results. In inspecting the blue cloth jacket taken from Janus' wardrobe, the investigator noticed that the sleeves and collar bore marks of ripped-off galloons and emblems; also the uniform buttons were replaced with conventional ones, and a piece of cloth bearing a factory trademark was sewn onto the lining.

Janus' relatives, to whom the jacket was presented for identification, testified that the former had never owned such a garment; they also declared his blue striped suit, yellow scarf and green hat were missing.

When the investigator went to the factory whose trademark

was sewn onto the cloth jacket, he discovered that the article was part of a merchant marine uniform, one of the thirty the factory had tailored to the order of the Polish National Shipping Company, which still kept lists of the employees who had received them. Of the thirty, fourteen continued to be with the shipping company and wore the suits: fourteen former employees still had them; and only two did not. When the police checked the last two, they discovered that one was a young man, Edmund A., a resident of Swiecie who twelve days after the murder was detained on suspicion of swindling; he was wearing a blue striped suit.

When interrogated, Edmund's wife and mother-in-law testified that, at his request, they had ripped off the galloons and emblems from the uniform jacket and had replaced the metal buttons with conventional ones. In fact, they showed the ripped-off galloons, emblems and buttons. Then the investigator showed them the jacket found in Janus' flat. After examining it, they identified it as Edmund's. They said he was wearing it when he went to Poznan, and returned in the blue striped suit, but refused to explain where he got it. Also, shortly after his return, he gave his wife a ruby-studded gold ring she had never seen him have before.

After Edmund was detained for swindling, the militia had handed over to his wife the blue suit, yellow scarf and green hat he was wearing. But, later, they instantly took away from her all the articles, as well as the gold ring to produce them as material evidence to Janus' relatives, who declared they all belonged to the slain man.

Shortly thereafter, the militia managed to find the tailor who had made the blue suit for Janus, and he identified it not only by the material and cut, but by the way it was attached to the lining, and also because the watch pocket was sewn in on the left side of the trousers, not on the right side, as was usual.

Presented with all this evidence, Edmund A. pleaded guilty of murder. Then he was submitted for identification to the people who saw Janus in the café on the eve of the killing, and all declared that he was the young man who was together with Janus that night.

There have been cases where presented items have been falsely identified and where people have lied in claiming that they

do not recognise an object. This usually happens when the identifier is interested in misleading the investigation, or when he fears the criminal or his accomplices might later take vengeance on him for exposing them. Hence, identification results must be verified. One way of doing this is to present the same objects for identification to other persons.

In presenting various objects for identification, the investigator should apply the general tactical techniques. He should first question the identifier in detail about all the individual marks of the object to be identified, specifically about its name, purpose, date of manufacture and length of use, quality, material, colour, condition, nature of surfaces, flaws, trade marks, inscriptions, etc. In addition, the identifier might show some concrete object similar to the one in question. In that case the investigator should inspect it and have the identifier tell him in what way was it similar with the object to be identified. Occasionally, during questioning, the identifier might voice his desire to draw the object to be identified so as to show its marks more accurately. The investigator should comply with this request.

The object should be presented among a group of similar objects, with the exception of unique items that would invariably be conspicuous in any group of articles, e.g., an original painting.

In the course of an investigation, there is often a need to identify documents representing material evidence. A document should be identified by its outer appearance, graphics and general visual image of the text. Prior to identification, the investigator questions the prospective identifier about the following distinctive marks in a given document: ink colour, location of corner stamp or round stamp, blots, corrections, position of signature, chance features in writing a given letter or digital element, etc.

The common and specific marks of writing or handwriting cannot serve as the basis for identifying a document, since those marks may be analysed and assessed only by means of expert graphic examination.

Documents or papers should be presented for identification among similar documents or papers. However, if a document has distinctive marks that would make its presentation for iden-

tification among other documents senseless, the investigator should present it alone to the would-be identifier.

The tactics of presenting animals for identification would be essentially the same as that of presenting inanimate objects. Identification is made by such distinctive marks as breed, colour, age, brand, and shoeing particulars; physical peculiarities and defects; training peculiarities, including animals' reaction to signals or other irritants; and various articles worn by animals.

Presenting localities and/or premises for identification.

In the course of a preliminary investigation, the need might arise to have a witness or suspect identify a given site or some premises. This investigation action is sometimes mistakenly termed an investigation experiment, though it does not involve any reconstruction of the surroundings or circumstances of a given event.

When presenting premises for identification, the investigator should comply with the same tactical rules as when presenting all other objects. He will ask the identifier about all the marks of the premises to be identified; about their layout, dimensions and form; about the number, shape and arrangement of windows and doors; about the specifics of the floors, ceilings, walls and heating appliances; about the furniture and its arrangement; and so on. Then he will permit the identifier to visit several premises, including the one to be identified.

Suspect S. testified that he had given a bribe to P. in the latter's flat, where he had never been before. He also stated that he knew P.'s home address, but did not remember the flat number and floor. S. described in detail all the furniture items in P.'s flat and claimed he could identify them.

However, P. denied taking a bribe and also the fact that S. had been in his flat. Under the circumstances, the investigator decided to present P.'s flat to S. for identification so as to check the authenticity of their testimonies. S. was given the opportunity to visit, in the presence of the investigator and witnesses, four flats with similar layouts, including P.'s flat. S. recognised P.'s flat by the arrangement and details of the furniture and by the colour and pattern of the wallpaper. Thus, the fact that S. had been in P.'s flat was confirmed.

Sometimes, there might be a need to identify some locality, or premises by photographs, even though actual presentation

of the locality, or premises in question is always preferable (no picture can give a complete idea of all the marks of the object to be identified).

Identifying by photographic pictures. The circumstances involved do not always make it possible to present to the would-be identifier the individual, corpse, item and/or animal to be identified. In this case, these subjects and/or objects may be identified by their photographic images. The identifier is given either a picture in which the object to be identified is shown among other (at least three) similar objects, or picture of the object to be identified together with pictures of similar objects taken in the same conditions and scale. These pictures are identified in compliance with the same procedural and criminalistic requirements as those essential in identifying real subjects or objects.

Pictures of living persons are presented for identification when the suspect and the would-be identifier are situated in different places and it is either unfeasible or inexpedient to bring one of them to the whereabouts of the other; when direct presentation of the person to be identified is not in the interests of the investigation; when the person to be identified is dead; and also when evidence concerning the whereabouts and identity of the person to be identified is absent, but the album of criminals' pictures in the hands of the respective public security agency contains photos of persons whose possible involvement in the case must be checked.

The results of identifying people by their photographic images have the power of court evidence. Hence, it is questionable whether presenting the real individual for identification would be advisable after he has been identified by his picture. If the identifier managed to identify an individual even by his picture, which would not reflect all the object's features, and would not allow the identifier to examine him completely, there is no need to repeat the identification in life. On the other hand, when the identifier declares he cannot identify any of the people whose pictures were shown to him, the approach would be different. Given that the image of the subject to be identified in a picture would not be complete, the investigator, if possible, should present for identification the person in question. In this case, the identifier might identify him by marks not reflected in the picture.

When preparing to present people's pictures for identification, the investigator should always clarify in what period of their life the identifier knew, saw or observed them and then produce the picture corresponding precisely to that period.

The tactics of presenting pictures of corpses for identification would be almost the same as with pictures of living persons.

Identification of articles by photographs is useful if the article is lost but its picture is still available, or if the identifier lives at a distance away from the place of investigation and it would be neither feasible nor expedient to send him that object or to call him out.

To help in the identification of an object by its photograph, it is advisable to photograph it together with a ruler and use colour film.

3. RECORDING THE COURSE AND RESULTS OF PRESENTATION FOR IDENTIFICATION

A record is the principal document in which the conditions, course and results of presentation for identification are set down. The record of presentation for identification, in addition to the usual data on its locality, time, and participants should indicate:

(1) how presentation for identification was organised, the sequence in which it took place and the location of the object to be identified among identical objects;

(2) the exact question posed by the investigator to the identifier;

(3) the identifier's testimony regarding identification of a given object, including his explanations concerning the distinctive marks or peculiarities by which he recognised that object.

The record must be signed by all who participated in the identification process.

Photography is used as an auxiliary means for recording the results of presentation for identification. It is helpful in recording objects presented for identification, their distinctive marks and peculiarities, and in witness thereof, the investigator should make notes in the respective record. In identifying an object by pictures, the investigator should append to the file a photographic table that would include the pictures presented.

Chapter 14

THE ART OF INTERROGATION

1. GENERAL

In investigating crimes, the interrogation is the process whereby evidence is obtained from a person possessing information significant to establishing the truth.

Interrogation, of course, is one of the most widespread investigatory actions. Notwithstanding possible success in examining "mute" material evidence, people still provide the main source of information in investigating crime and its participants, since a case invariably concerns the actions of people, against people and among people. Moreover, testimony is a means for protecting suspects and indictees against unwarranted suspicion or indictment.

An interrogation should always be designed to obtain truthful, objectively correct and comprehensive evidence. Not infrequently, however, the examinee, in sincerely wishing to help the inquiry and believing he is telling the truth, will unwittingly supplement his story with either figments of his own imagination or with details suggested by other people. Then the investigator has to determine where the truth ends and invention begins, helping a witness recall what he actually saw and eliminating conflicting evidence. With these aims in view, special interrogation tactics have been developed.

A certain Bashmakov, a resident of Alma-Ata, Kazakhstan, fell victim to a violent street assault. His version of the story was that one evening he was intoxicated and walking along a well-lit street when two militiamen stopped him, asked his address and wanted to take him home. But Bashmakov told them he would manage himself, and just asked them for a cigarette, which he obtained and continued on his way. Hardly had he turned the corner onto a dark street when someone stabbed him

with a knife. He thought it was one of the militiamen. Then both assailants knocked him down and stole his money. Bashmakov started screaming, and one of the militiamen fled; the other stayed and helped him reach a first-aid station.

The two militiamen were easily identified: that evening they were on duty, patrolling their usual block. The next day Bashmakov identified both; but their version of the incident was totally different.

In reality, the two militiamen bumped into Bashmakov in the street. He was drunk, so they wanted to take him home. But when he told them his home was near, they yielded to his persuasions and let him go himself after giving him a cigarette. Afterwards, they stayed where they were for some time and watched the drunk man walk two blocks and turn round the corner. Then they heard a cry for help, and ran to find Bashmakov lying prostrate with a knife wound. One militiaman stayed with him to give him assistance, and the other ran along a side street in the direction where the assailant might have disappeared, but found nobody.

Bashmakov insisted on his testimony, and only several days later, thanks to measures by militia operatives was the actual assailant found. In testifying against the two militiamen Bashmakov, under the influence of alcohol, had a confused perception of time and distance, and had utterly forgotten the encounter with his real assailant.

An investigator comes across such mistakes quite often, though usually they are less dangerous as regards possible consequences, particularly when questioning children and teenagers.

An interrogation is not only the most widely used but the most difficult investigatory action. It requires that the investigator have a high degree of professional training, a profound knowledge of the human mind and the ability to skilfully use interrogation tactics. The interrogation process is also made more difficult in that the investigator is occasionally faced by a person reluctant to tell him the truth or say anything at all.

An interrogation is a process whereby the examinee passes to the investigator information about a given event or concerning circumstances and individuals related thereto. The process through which evidence accumulates, from perception to transfer of information, is essentially psychological in nature. Through-

out it the examinee is influenced by numerous objective and subjective factors whose effect might, in the end, affect in one way or another the completeness and objectivity of evidence. Some typical objective factors that might interfere with the perception of the investigated event are: unfavourable weather conditions, considerable distance of the observer from the site of the event, short duration of the event itself or of the observation, etc. Conversely, good lighting, proximity of the object of perception, and lengthy observation would help more complete and accurate information.

Subjective factors, such as being in state of high excitement, fear, fatigue or in normal condition, voluntary or involuntary attention, absence or presence of interest for the observed event, etc., affect the results of interrogation in exactly the same way.

In a Polish court, two witnesses testified that the defendant was the very man who, in front of their very eyes, had carried away some private belongings from a yard. Another witness identified him as the man who was detained in the street when attempting to escape. But the same witness added that at that time the man was fatter. During the trials, however, it turned out that the crime had been committed not by the defendant, who was mistakenly identified by the witnesses but by someone else.

One female victim declared that three tall males had assaulted her and that two of them held daggers. However, later on, it became clear that there were only two assailants, both unarmed, and one was holding a bunch of keys. So, the victim's testimony had formed under the effect of fear.

One witness says the man in question was wearing a green raincoat. But later it turns out the raincoat was brown and the witness is colour-blind.

An eyewitness to a traffic accident says the driver of the automobile which knocked down a pedestrian was a girl, and that she was driving at very high speed and did not even bother to stop. But then it turns out the driver was a young man with long hair. The witness just noted the long hair, and the rest was merely a figment of his imagination.

The investigator must be fully aware of the effect of all these factors which are, in fact, the subject of forensic psychology. For an interrogation to be successful, he must clearly know what

information he intends to obtain from the person he is questioning and by what techniques. The range of circumstances the investigator intends to clarify by way of interrogation is termed the *subject* of interrogation. These would include circumstances connected with the crime itself, specifically with its methods, site, time, consequences, etc.; those that would confirm or refute the guilt of definite persons and establish the motives of their actions affecting the degree and nature of responsibility; and also those relating to the nature and size of damage inflicted by a given crime. The subject of interrogation may include circumstances that contributed to the crime. In fact, the subject of interrogation may encompass virtually any circumstance that has significance in establishing the truth. The subject of interrogation would depend both on the procedural status of the person being questioned and on the information he may possess.

Depending on the procedural status of the examinee and, consequently, in a sense, also on the subject of the interrogation, we would distinguish:

—interrogation of a witness;
—interrogation of a victim;
—interrogation of a suspect;
—interrogation of the accused; and
—interrogation of an expert.

Questioning during a confrontation is a special type of interrogation.

Every type of interrogation is governed by its procedural regulations and differs tactically. However, there are certain general procedural and tactical provisions that are applicable in any type of interrogation.

General procedural provisions. The procedural rules of interrogation stipulate that it may be carried out either at the investigation site or at the location of the examinee, and as a rule during the day. Persons subjected to questioning testify to the interrogator without witnesses, except in cases directly stipulated by law, i.e., when the presence of a lawyer, teacher and/or legitimate representatives or close relatives of an underage examinee is required.

Prior to questioning an examinee, the investigator, if need be, verifies the identity of the person in question; explains to

him his rights and duties; and clarifies certain biographical facts. The interrogation itself essentially begins by asking the examinee to relate everything he knows about the case. Afterwards, the interrogator will start asking him questions.

The examinee's testimony is written down in a record in the first person singular, and, if possible, in verbatim form. Sometimes, the investigator writes down in the record both his own questions and the examinee's answers. After the latter has testified, the investigator permits him to write his testimony with his own hand if the examinee so desires. After the interrogation is over, the investigator permits the examinee to read the record or, if the latter wishes, reads it aloud to him. The correctness of the recorded testimony is certified by the signatures of the examinee and the investigator.

General tactical provisions for conducting an interrogation. These include vigorous purposeful, objective and complete questioning, and the need to take into consideration the personal traits of the examinee.

Vigorous questioning implies that the investigator shall firmly hold the initiative and skilfully use all necessary tactics to achieve the aim of the interrogation, but in strict conformity with the law. With regard to persons reluctant to testify truthfully, the interrogation should be conducted in a forceful manner, using all legitimate means available to the investigator, who shall seek to obtain thereby truthful information and not simply write down the evidence given to him.

A purposeful interrogation indicates that questioning is carried out with a preset objective in mind so as to obtain definite, not general, information. This is ensured when the investigator knows for certain what he wants to ask; when he seeks to achieve his purpose; and when he can co-ordinate his techniques with that purpose.

Objective and complete questioning is achieved due to the fact that the investigator does not have the right to shorten at his discretion the evidence obtained; change it in accord with his own ideas, nor impose those ideas on the examinee. By prohibiting the investigator from posing leading questions to the interrogated person, the law guarantees objectivity of interrogation and, by requiring that testimony be recorded in verbatim form, its completeness.

The success of an interrogation depends on how fully the investigator takes into account and makes use of the personal traits of the examinee, viz., his mentality, cultural and educational levels, profession, outlook, etc. Otherwise, he will fail to establish psychological contact with the examinee, and without this contact, the objective of the interrogation will remain essentially unachieved.

Psychological contact with the examinee implies the creation of an atmosphere of trust where the person undergoing the interrogation comes to respect the investigator; to understand his tasks and duties; exclude the possibility of any personal motives on his part, and realise the need to make his own testimony helpful in establishing the truth. If the investigator deceives and tries to entrap the examinee, the latter will lose confidence in him, and this could lead to a conflict situation. In this case, the investigator could never establish any type of contact.

To choose the right interrogation tactics, the investigator must also take into consideration the examinee's psychological traits. The art of questioning is divided into initial, secondary and additional interrogation stages. In *initial* questioning, the subject of interrogation is clarified to the end, except in cases when, for tactical considerations, the investigator regards it necessary not to dwell on circumstances whose elucidation would require other preliminary investigatory actions. In *secondary* interrogation, the investigator seeks further information about all or some of the circumstances concerning which the examinee has already testified at the previous interrogation. A secondary interrogation is aimed at detailing and specifying previously obtained evidence; at obtaining repeated evidence in order to compare it with the initial evidence for possible contradictions; and at trying to make the examinee alter his mistaken stance and give truthful evidence.

Unlike secondary interrogation, *additional* interrogation is a process whereby the investigator seeks to obtain evidence concerning circumstances not touched upon at previous interrogations. The purpose of an additional interrogation is to complete the evidence already obtained. Hence, an additional interrogation may essentially be in a question-answer form that would exclude any free account by the examinee.

2. PREPARING FOR AN INTERROGATION

Before beginning an interrogation, it is essential that *initial evidence* be gathered. The sources and content of the initial data may differ, therefore, the investigator should, first of all, distinguish those relating to the subject of interrogation.

In preparing to start an interrogation, the investigator should determine the range of circumstances for which he will have to obtain evidence from the would-be examinee. When the investigator has no clear idea about those circumstances, the interrogation loses its purposefulness, and the testimony will inevitably have gaps; on the other hand, it will also contain useless data unrelated to the case in question.

The file might already contain evidence related to the subject of the upcoming interrogation. The investigator should study all the evidence related to the case in order to prepare for the interrogation. The information thus obtained in the form of excerpts or notes specifying which pages in the file contain the data needed for subsequent questioning and specifically what data, should be systematised by the investigator with regard to the circumstances to be touched upon during the interrogation. The investigator should pay special attention to evidence relating to the guilt of a given person in committing a crime (when preparing to question the accused), or to the personality of the accused (when preparing to question victims and/or witnesses).

Information relating to the subject of interrogation may be specialised in nature. Hence, the investigator might need to read special literature concerning, say, production processes, the system of document and commodity circulation at a given industrial enterprise, its system of stock-taking and accounting, etc. In this case, he may ask for consultation from specialists and use the evidence contained in conclusions of experts in the given case and also reference materials.

Initial data concerns the would-be examinee's personality. The scope of relevant data needed by the investigator depends on the examinee's procedural status, circumstances of the given case, subject of the upcoming interrogation and significance of the evidence that might be obtained from him. It is especially important for the investigator to study the examinee's personality. This is necessary not only for conducting a successful in-

terrogation but for the investigation as a whole; it is also essential for the case to be correctly resolved in court and for conducting subsequent work aimed at reforming and re-educating the criminal.

Data on the examinee's personality would include his psychological traits and condition, socio-political and labour activities, attitude towards his colleagues and vice versa, moral image and behaviour in everyday life, and attitude toward other people involved in the case.

A study of the examinee's personality helps to determine the specific way in which he will relate his evidence; to gain an understanding of how he will behave in the forthcoming process; and to work out required interrogation tactics.

In examining personal psychological traits that could affect the completeness and accuracy of evidence, A. F. Koni, an outstanding Russian lawyer, wrote in his work *Memory and Attention* that in order to characterise the influence of a person's temperament on his evidence, one could, for example, imagine the attitudes to the same event of people with different temperaments. Imagine that a tram knocked down a woman crossing the rails and has either severely injured or perhaps killed her because she failed to hear a warning bell or because the latter sounded too late. *A sanguine* person would relate that it was an awful accident; that there was a piercing cry and lots of blood, that it even seemed to him he heard bones crack, and the whole event still stands before his eyes. A *melancholic* person would say that the streetcar had, in his presence, run down an unfortunate woman, who might have been hurrying to see her loving husband and children, but now everything was shattered and gone to leave but tears and grief over the irretrievable loss, and the picture of an orphaned family painfully affects his being. A *choleric* person would indignantly say that they had run down a woman, and that he had long kept saying the municipal board was careless in fulfilling their duties; he would also exclaim that he cannot understand how they can allow a tram to drivers who cannot ring in time to forewarn a pedestrian who is either distracted or hard of hearing. He would finalise his tirade by exclaiming that there you have it, and that people like that tram driver should be strictly prosecuted for such deriliction. Again, a *phlegmatic* person would say that he

was going in a cab when he saw a tram and a crowd of people nearby watching something; he stood up to see a woman lying across the rails, probably having been knocked down and overrun. He sat down and told the cabby to hurry up.

Now, based on the fact that witnesses' and victims' testimonies sometimes contain mistakes, should we not infer that they are altogether unreliable as sources of information and that investigators should disregard people's evidence, for, as the ancient Romans used to say, *errare humanum est?* Many bourgeois legal specialists would answer affirmatively. As methods of examining material evidence developed, attempts were made to undermine confidence in witnesses' testimonies. W. Stern, a German criminalist, carried out a test with thirty persons, to whom he showed three paintings. Only five per cent of the three hundred relevant testimonies proved correct. Two other bourgeois criminalists, namely List and Claparède, feigned disturbances in a university auditorium. Then they questioned the students, who did not suspect that they were subjects of an experiment, and only one testified correctly.

But, in the first place, these and similar experiments were obviously insufficient to make it possible to conclude that the testimony of witnesses is for the most part unreliable; secondly and it is probably most important, the environment in the tests was remote from reality and the criteria for assessing the results were sometimes so strict as to make one think the experimenter intentionally wanted to obtain precisely that negative result.

In evaluating the results of List's and Claparède's experiments, I. N. Yakimov, a pioneer of Soviet criminalistics, wrote as early as 1925 that lies, intentional and unintentional, were and always will be present in witnesses' testimonies, and the issue is essentially not in whether to trust or altogether mistrust witnesses' evidence in view of its falsehood but to decide whether it contains more truth or lies. Yakimov went on to say that this question could be answered with certainty by indicating that, both in life and in criminal cases, witnesses' testimonies invariably contain more truth than falsehood. Forensic mistakes based on witnesses' false evidence are, fortunately for mankind, not the rule but the exception, and social life would be totally impossible if lies in people's words and deeds prevailed over truth.

It is important not to speculate on the degree to which evi-

dence is accurate, but to clarify the causes of deviation from the truth in order to subsequently take them into account and overcome, to reveal the action mechanism of those causes, and the role of specific factors affecting the shaping and completeness of evidence. Only tests based on correct methods and correct evaluations can be instrumental in deciding the authenticity of witnesses' evidence.

One such experiment was carried out by Romanian criminalists, who feigned a quarrel and fight at a market place in Bucharest. The subjects in the experiment included persons present there at the moment and those who later investigated the case. Neither the former nor the latter knew the whole thing was feigned, but all the action was filmed and recorded without their knowledge. The behaviour of the "disturber of the peace" was preplanned and rehearsed. Most of the witnesses were questioned during a period ranging from 7 to 14 hours after the "event", and three of them two months later. In addition to being written down in a record, all evidence was recorded on tape.

The questions put to the subjects chiefly concerned the "disturber's" behaviour before and during the incident, and also his appearance and the time of the "event". A subsequent analysis of 232 answers showed the most accurate ones to be those relating to the chief moments of the event. In fact they made it possible to establish with the needed degree of accuracy all the substantial details that could interest the investigators. Suffice it to say that 85 per cent of the answers were recognised as correct, 6 per cent as uncertain, only 8 per cent as incorrect and 1 per cent irrelevant to the case. In this way, the experimenters disproved statements designed to compromise the witnesses' evidence.

An interrogation should be *tactically guaranteed* by devising a plan beforehand.

A written plan is preferable when a tactically complicated interrogation designed to elucidate a wide range of circumstances by using considerable initial information is in store. Its form is arbitrary, but the following basic points could be recommended: (a) circumstances to be elucidated; (b) available data (source and page number in file); (c) questions to be asked; and (d) notes on possible tactics.

When there is no time to prepare for an interrogation, and also in preparing for simple questioning, the investigator may plan it mentally or draw up a written plan in simplified form, occasionally as a simple list of questions to be posed to the examinee. In this case, the investigator should, naturally, bear in mind that it would hardly be possible to envisage all the questions in advance. So he should plan only the most important ones, which he can, of course, envisage, and also those for which the formulation and/or sequence of a given question and its correlation with previous and subsequent questions, would have special significance.

The investigator could ask the examinee: (1) supplementary questions; (b) specifying questions; (c) reminding questions; (d) control questions; and (e) exposing questions.

Supplementary questions are those that the investigator poses to the examinee to complete obtained evidence and eliminate gaps therein. They could be aimed at detailing evidence, for example by asking: "You told me you were at the cinema. What film did you see, and were you there till the end of the movie?"

Specifying questions may also be posed to learn more details about some evidence, but more often to concretise already obtained evidence. For example: "You have testified that the knife lay by the body. Do you remember on what side and at what distance?"

Reminding questions are designed to refresh the examinee's memory and cause associations that could help him recall facts that interest the investigator. Normally, the investigator poses several reminding questions so as to help the examinee consecutively recall the events he has forgotten. For instance, knowing that the event that interests him took place on the examinee's birthday, something the latter has forgotten, the investigator would consecutively ask: "How did you celebrate your birthday this year?", "What were you doing after the guests left?", "In what side of the park were you strolling?" "Why did you change your seat?", and "Exactly when did you first see the accused Ivanov?" Reminding questions should not be confused with leading questions, i.e., with those whose formulation would in itself contain the answer desirable to the investigator, e.g., "Was Ivanov wearing a gray raincoat with metal buttons that eve-

ning?" Since such leading questions have a suggestive effect on the examinee and hint at the answer the interrogator would like to hear (and could therefore prevent the latter from establishing the truth), Soviet law categorically prohibits them.

Control questions are asked to verify previously obtained evidence or to obtain new data for checking that evidence. For example, an investigator might ask: "On what grounds do you assert that everything you said happened precisely on September 15?"

Exposing questions are aimed at revealing to the examinee that the investigator knows he is lying. Normally, such questions are posed along with the presentation of evidence that disproves the examinee's testimony and evokes no doubt in the investigator that it is authentic.

As a rule, an exposing question consists of two parts. The first establishes that the examinee has been presented with a given evidence, and the second contains a suggestion that the examinee should explain that evidence or some circumstance related to it. For example: "Here is the decision of an expert in fingerprint examination saying that your right-hand fingerprints were found on the glass lying on top of a desk in the flat of Ivanov, the victim. How is it they were there if you assert you have never been in his flat?"

The investigator's questions should be clear, concrete and understandable to the examinee, and should relate to the subject of the interrogation. They should also be consistent and well-grounded.

In addition to planning, an interrogation should include appropriate techniques and preparation of evidence that might be needed for presentation to the examinee. The investigator would, in advance, decide precisely what evidence is to be used and when to present it; he would select it in the needed order, plan measures for ensuring its safety during the presentation and choose a special storage place prior to presentation.

Selecting the time and place for an interrogation. An interrogation should be timed with consideration for the significance of the evidence which, in the investigator's view, is available to the examinee, and also depending on the latter's procedural status, role in the investigated event, and relations with other people to be interrogated in the given case. For some categories

of examinees, the timing of an interrogation would in a sense be determined by law; for instance, under Soviet law, a detained or arrested suspect must be questioned within 24 hours from the moment of detention or arrest, and someone who has already been charged immediately after indictment.

The timing of an interrogation is also influenced by the sequence in which the investigator decided to question people involved in the given case; by the interests of keeping some parts of the investigation secret; and by the extent and nature of the emotional experience of the people to be questioned at the moment of the crime. Except in urgent cases, it is not advisable to question persons experiencing strong emotion, confusion, and/or anxiety till they return to a normal state.

The decision whether to perform an interrogation at the site of the investigation or at the home of the examinee depends on concrete circumstances in each given case. But, in all instances, the investigator should try to make the place for interrogation comply with the requirements stipulated by law, that it be convenient for questioning; conducive to establishing the necessary psychological contact with the examinee and to focussing his attention on the subject of the interrogation; and ensure secrecy. It would be undesirable for other interrogators not involved in the case, much less outsiders to be present during an interrogation; also, there should be no superfluous items on the investigator's desk and the phone should be switched off if it is not needed for interrogation purposes.

Determining ways of summoning witnesses, victims or suspects for interrogation. Among the ways stipulated by law for summoning undetained witnesses, victims or suspects for interrogation, i.e., by phone, telegram, subpoena, or bringing to a militia office for questioning, the investigator shall select that which, in a given situation, would best help establish psychological contact with the examinee; keep secret the fact that a summons was issued; and make it possible to conduct the interrogation at the planned time and place.

An interrogation is *technically guaranteed* by (a) preparing the needed record forms, stationery and typewriter; (b) providing a stenographer if the investigator plans to record the interrogation in shorthand; (c) preparing a tape recorder or dictaphone, if available; (d) providing necessary vehicles and

guards if such are needed to bring the examinee to the place of interrogation; and (e) preparing a suitable room.

3. GENERAL TACTICS FOR QUESTIONING WITNESSES AND VICTIMS

Whereas the interrogation as a whole is the most widespread investigatory tool of all, the questioning of witnesses is the most widespread type of interrogation. It may be said without exaggeration that the need to question witnesses arises in investigating any crime, for the subject of such an interrogation is any circumstance relevant in the case, including circumstances relating to the personalities of the accused and the victim and to their mutual relationship with the witnesses.

Any person capable of correctly perceiving circumstances significant in a given case and of giving correct evidence, may be a witness. The only exception would be the defendant's lawyer who shall not be questioned on circumstances that he has learned in a given case while fulfilling his duties of defence counsel, and also persons who enjoy the right not to incriminate i.e., the right to refuse to give evidence against his (her) relatives or wife (husband).*

The law usually sets no minimum age limit at which a person may be questioned as a witness. The ability of a child or minor to perceive an event correctly and give evidence thereon would depend, apart from general factors, upon his mental development and upon his understanding of some specific fact, and this must be taken into consideration when evaluating his testimony.

A witness may be both an individual who has directly perceived a criminal event or other relevant circumstances, and one who has learned about them from other people or documents. In the latter case, he would have to report the source of his information. A witness who has personally perceived an investigated event is usually called an eyewitness.

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* See §65 of Hungary's criminal law procedure code and criminal law procedure codes of some other countries. In the USSR, there is no law stipulating that witnesses have the right not to incriminate themselves on others.

Sometimes, evidence given by a person who could not even be really called a witness, since he had actually seen and heard nothing, might prove to be the "clue" to solving a crime.

At the end of the last century, the people of St. Petersburg were shocked by the cruel murder of a fourteen-year-old girl, whose corpse was found in the attic of a residential building. The entire criminal police force was called to action, but they failed to find the culprit.

Artist B. was also shocked by the atrocious murder, and its dramatic descriptions in the press influenced his imagination to such an extent that he made a painting about the subject. The painting was so good that it was exhibited in an art gallery. It showed in detail the attic and the strangled prostrate girl and in the background, sinister-looking silhouette of the retreating murderer: with his right hand, he was opening the attic door while half-turned toward his victim. The man was a loathsome hunchback with a huge mouth, pointed red beard, small malicious eyes and lop ears.

The painting appeared in the gallery some six months after the killing. One day, a viewer cried out and fell face down, writhing in convulsions. Other viewers ran up to him and were amazed to see how closely he resembled the murderer depicted in the painting. The man was taken to the nearest pharmacy, and when he regained conscience he asked someone to call the police. He then confessed that he had killed the girl. He said he came to the exhibition quite by chance and saw in the painting not only his victim and the attic in all its details, but also himself. He added it was a real enigma to him who could have painted him in that terrible moment.

The police detained artist B., suspecting that even if he was not an accomplice, he might have at least concealed the criminal for some time. B. explained that he saw the criminal by chance under the following circumstances: he was very excited by stories of the killing and decided to paint the whole scene. He went to the site of the crime and made detailed sketches of the attic. He drew the body of the strangled girl in a morgue and learned about the posture in which she was found murdered. He drew all that, but then the image of the killer was lacking. For some reason, he imagined him to be physically repulsive like Quasimodo. He said that, before, he also used to roam

about Vassiliev Island, where time and again he found suitable models in the taverns of Galley Harbour. In quest of a good model, he entered one at the corner of 20th Line to find a man amazingly similar to the image he had in his mind. The man was sitting at a table not far from B. and sipping his tea. B. took out his sketch book and began to draw him. Later, the tavern-keeper told B. the man frequented the place every day at about the same time, and B. began visiting it at that very time; in about five days, the man's exact image was ready.

When questioned by the police, the tavern-keeper corroborated B.'s testimony, and the latter was released.

Like a witness, a victim, i.e., the person upon whom a criminal has inflicted moral, physical and/or property damage, may be questioned about any circumstance to be proven in a given case, and also about his mutual relations with the accused. He differs from a witness in that the crime has violated his rights and law-protected interests. In fact, a victim has an interest in the outcome of the case. This interest, and also the possibility that the victim may have wrongly perceived certain facts because of circumstances at the time and the danger to which he may have been subjected, should be taken into account when questioning him and evaluating his testimony. Otherwise, the tactics in questioning a victim and a witness are very similar.

As has already been noted, it is essential in achieving the objective of an interrogation for the investigator to *establish psychological contact* with the examinee. This would depend on the situation during the interrogation, the investigator's comportment, self-control, tone of voice and appearance. The form in which he advises the examinee to cooperate and tell the truth also has definite significance. The investigator should not adhere to formality here: depending on the examinee's personality and his anticipated behaviour during the interrogation, the investigator may choose to advise him in a strictly official manner stressing the examinee's possible responsibility before the law or might cautiously explain to the latter the requirements of the law, underscoring the fact that they apply to all witnesses and victims, and also that the warning is being given as a matter of course, not because the investigator mistrusts the examinee.

To establish contact with the examinee, the investigator may

also make use of his conversation with the former when filling in his biographical details in the interrogation record. In this case, the investigator may go off the record and ask not only biographical details but also other things relating to the examinee's personality, friends, life and work conditions and psychophysiological traits. In establishing contact with the examinee, the investigator should also seek to obtain additional information about his personality.

Having explained to the examinee the order of the interrogation, the investigator asks him to recount everything he knows about the case. This would be the beginning of an interrogation stage called the *free account.*

A free account is essentially a narration of facts known to the examinee in the order either suggested by the investigator or chosen by the examinee himself. This stage is important due to the following reasons:

(a) the investigator does not always realise what facts and to what extent are available to the witness or victim. In a free account, the examinee could give information about which the investigator did not even suspect and which he, therefore, would not seek to obtain when posing questions to the examinee;

(b) when the examinee relates certain facts in the order suitable to him, it is easier for him to recall them and helps him reconstruct in greater detail all he has perceived;

(c) a free account helps the investigator to get a fuller and more accurate idea about the examinee's mutual relations with other persons involved in the case, about the line of conduct he chose during the investigation, and about the extent to which he is actually informed of all the circumstances surrounding the event.

The investigator may suggest that the examinee follow a definite sequence of events in his narration when the latter must testify on many episodes or circumstances thus finding it difficult to choose the proper sequence himself. In some cases, the investigator may suggest that the examinee first explain a definite fact and only then speak about the rest. In criminalistics, this tactical method is termed "splitting the subject of a free account", and its purpose is two-fold: either to direct the account along definite lines (to elucidate the most important circumstances), or to keep the examinee from giving false evidence, if the investiga-

tor has reason to assume this could happen. In the latter case, having testified truthfully about a certain fact, the examinee would be compelled to give a truthful account about all the other facts too, so as not to contradict himself.

As a rule, the investigator should not interrupt the examinee's free account with remarks or questions. Any such interference may lead the latter astray, and then the sequence of narration could be broken. This could lead to inconsistency in testimony and the omission of some important evidence. It is only when the investigator has realised that the examinee has digressed from the subject and that the digression is unnecessary for him to recall facts that might interest the investigator, that the latter may tell him to keep closer to the subject. It is inadvisable for the investigator to interrupt a free narration in order to demand from the examinee a more detailed account of certain facts. This could be done at the next interrogation stage without risking to interrupt the examinee's trend of thought.

During a free account by the examinee, it would be inadvisable to record his testimony, since that would inevitably lead to interruptions that would distract him, weaken his efforts in recalling certain facts and break possible associative links in his mind. At this stage, the investigator should only make notes about the ideas that occur to him during the free narration, about possible omissions and about the questions he would later want to pose to the examinee. In fact, the latter must all the time feel the attention and interest with which the investigator listens to his story, for this will strengthen his belief in the significance of his civil duty in rendering useful aid to the given inquiry, and could also prompt him to testify truthfully. Moreover, the investigator would be able to perceive more fully the examinee's free account and to analyse and evaluate it more correctly.

There are very many examples showing how detailed, complete and accurate free account by witnesses and/or victims can be.

One summer evening, Michel Roy, a wealthy Frenchman and his wife were playing bridge in his house with another couple. A few minutes after eleven, they heard the crunch of gravel on the path. The door opened, and two men pointed their submachine guns at the two couples. Then one of the two asked: "Which of you is Roy?" When nobody responded, the two ordered both Roy

and his male friend to follow them, and one of the criminals warned the women that if they called the police they would lose their husbands. The criminals took Roy and his friend to a car on the road, put them in the backseat and sped away.

As soon as the abductors were out of view, Roy's wife telephoned the police. At that time, the car drove out the town and stopped. The abductors searched both victims, and identified Roy by the papers they found on him. They pushed his friend out of the car, warned him not to inform the police where the car would be going, and drove northward.

News of the crime quickly spread across the country. Several days later, one of Roy's friends who lived nearby received a letter from the abductors, who proposed that he act as mediator between them and Roy's family in getting a ransom. They specified that as soon as they received the letter Roy's relatives should prepare 200,000 francs in used 1,000-franc banknotes, and warned that nobody should try to copy the banknote numbers or substitute them for ordinary paper, since otherwise Roy would suffer. The kidnappers stated that Roy would be released only after they had received and exchanged the money.

The envelope also contained Roy's letters to his wife and friend saying he was alive and well and waiting to be ransomed. If the mediator agreed to arrange the ransom, he was to place a specific advertisement in the local paper, which he did.

Several days later, he met with one of the abductors in a specified place and handed him the money. Roy's relatives had asked the police not to interfere during the transfer.

The next day Roy returned home. As soon as he had recovered somewhat from the shock, the police questioned him. It turned out that, knowing he would be asked for information, Roy, from the very start, tried to carefully remember all the details of the abduction which could help expose the criminals.

Shortly after pushing his friend out of the car, the abductors placed a blindfold over Roy's eyes and ordered him to keep silent. But despite the covering over his eyes, Roy sensed the bright light of the suburban power station, which he knew well, and which was located 20 kilometres from town. Approximately one hour later, he realised by the smell of petroleum that the car was passing a big oil refinery. The abductors made their first stop at 3.30 a.m. They took Roy out of the car in a direction leading away from

the road, and one of them drove to a petrol station. Fifteen minutes later he returned, and they continued on their way. At dawn, they drove into a garage and changed their car for a bigger one. There was a large case on the backseat and they told Roy to get in and keep quiet. Three hours later, they stopped for gas (Roy heard voices coming from the petrol station).

Between nine and ten in the morning, it started pouring rain; the road turned muddy, and the car began skidding. It took them a whole hour to get out of the mud.

Finally, the car stopped again. This was another garage. Roy asked the time, and one of the abductors told him it was 1.30 p.m. There they gave him something to eat. After dusk, they took him out of the garage, led him to the left, passed a narrow gate, ascended one step, walked fifteen steps along a path, went up three wooden steps and entered a house. They passed through one room into another to the left. The blindfold was still over Roy's eyes. The room had two beds, one for himself and the other for one of the abductors.

The criminals stuck cotton wool in Roy's ears and sealed them with sticky rubber tape. Still he heard yelping and mooing in the yard, and realised he was at some farm. From the neighbouring room, he heard muffled voices of a male and female.

At 10.00 a.m., he was taken out of the house, put in a small car, and taken to what appeared to be a small house with only one porch step, and that is where he spent the rest of the time until his release.

When he said he was thirsty, his abductors gave him water in a metal cup. He carefully felt it and realised it was an old cup with a semi-detached handle and a triangular chipped spot at the lower end of the handle. The water had a characteristic mineral flavour and was brought from a nearby well. Judging by the sounds when the bucket was lowered and lifted inside, the well was quite deep.

Every day at 9.45 a.m., an airplane would fly over the farm to return at 5.45 p.m. However, on Sunday, July 30, the plane failed to appear in the morning, obviously because of heavy rain. In the evening, it flew over the place, but much later than usual. On Monday, July 31, after lunch, the abductors took Roy out of the house, telling him they had received the ransom and he would be released. They took him by car to the outskirts of a

town and removed his blindfold. It was absolutely dark. The abductors gave Roy some money and left. Roy walked to the town, took a train and came home.

Already on the night of Roy's abduction, the police had established who among possible extortioners might have participated in the kidnapping. One was a certain Carlé, whose family lived at a farm situated at approximately the same distance as indicated by Roy. Then the police made inquiries of an airline to learn about flights in that direction and the specific time when they would pass over that farm. It was found that they flew over the area precisely at the time mentioned by Roy. On July 30, it rained heavily in the vicinity of the farm and, according to the plane log, the morning flight was postponed that day for two and a half hours. Moreover, when it did take place, the plane took another course; the evening flight was also delayed.

Police detectives inspected the area, and all Roy's testimony about the farm itself, the water, the well and the cup was confirmed, and the kidnappers were arrested.

After the examinee has finished with his free account, which, as a rule, does not exhaust the subject of interrogation, the investigator would *ask him questions* to supplement and specify his testimony; to reveal new facts not mentioned in the free account; to obtain control evidence necessary to verify previous testimony; and to help a witness or victim recall what they might have forgotten. If the investigator thinks the examinee has given false testimony but not through conscious desire, at this stage of the interrogation he should help him correct his mistakes. But if the examinee has given false testimony intentionally, he should be exposed as a liar and compelled to testify truthfully.

To "revive" the memory of a witness or victim (or that of a suspect or accused who is sincerely trying to recall a given event), the following interrogation tactics may be used:

1. Interrogation involving the use of associative ties. Perceptions occurring in the mind of a witness or victim in connection with a perceived event enter into mutual relationships called associative ties. Hence, when a witness or victim recalls a given fact this could cause him to recollect correlated facts (preceding, concomitant, investigatory, similar or contrasting). To revise such ties, the investigator might ask the examinee questions relating to contiguous facts (not to the main fact) and help him

first establish these facts (that may be well preserved in his memory), and then, by association with the latter, the fact sought for.

2. Interrogation on the spot. This is a type of interrogation involving the use of associative ties, when their revival is prompted not by a question asked by the investigator but by perceiving again by the examinee of the surroundings in which the investigated event had taken place.

A technique for reviving associative ties similar to questioning on the spot would be to have the examinee look once again at certain objects related to circumstances that interest the investigator. These objects may turn into peculiar stimulants for recalling forgotten facts, since their outer appearance might revive corresponding associations in the examinee's memory that could cause him to recall the sought after fact. This might also be achieved when the examinee, at the investigator's suggestion, graphically depicts a given situation, e.g., draws the arrangement of various objects at the site he has previously described, the position of participants in a given event or some specific object. In fact, the process of making such graphic images (maps, plans, drawings or pictures) could help revive the needed associative ties.

3. Secondary interrogation on limited range of circumstances. When the examinee repeats some previously given evidence, he may recall certain facts that he omitted or forgot during the first interrogation. Experiments have shown that, in approximately forty per cent of all cases, secondary testimony is more complete than the initial one. In no way, however, does this mean that the practice of secondary interrogation should be a rule. The only conclusion to be drawn is that in the first place, a secondary interrogation may occasionally help the examinee recall forgotten facts and, secondly, that the investigator should not necessarily suspect the examinee of dishonesty if, during a second interrogation, he mentions facts he had previously failed to recall.

Associative ties may also be used when a witness or victim unwittingly gives false evidence and sincerely believes he is speaking the truth. This may occur due to objective and subjective factors, including the influence of other persons and of the examinee's emotional experiences and imagination.

The investigator's task must be to separate all these "layers" from the actually perceived facts, try to eliminate the causes instrumental in distorting the truth and restore the examinee's perception of a given event in the form in which it really took place. Interrogation techniques involving the use of associative ties serve these very objectives. Moreover, the investigator may also acquaint the examinee to some degree with the testimonies of other persons about the same facts and also use methods of confrontation.

4. GENERAL TACTICS FOR INTERROGATING SUSPECTS AND THE ACCUSED

It is important to question the accused inasmuch as his testimony may serve not only as source of corroboration but also as a means of defence against a criminal charge. Furthermore, his evidence may also reveal his assessment of his own actions, and the investigator must know that assessment to make effective measures designed to reform and re-educate the offender.

Everything mentioned in reference to preparing for interrogation also pertains to questioning a suspect and the accused. However, special reference should be made to the specifics of preparing to question an accused formerly convicted of other offences. In fact, such a person would usually be well familiar with interrogation procedures and with his own rights, and he might also know various interrogation techniques. The investigator should take this into account when deciding upon the tactics of an upcoming interrogation. In this case, various data taken from archives criminal records could serve as reference points, for example, those relating to the attitude of the accused at previous interrogations; his personality and social contacts; his reaction to exposing evidence; and the tricks to which he resorted to mislead the investigator, camouflage his own actions and detract from his own guilt.

The establishment of psychological contact with an examinee is also accomplished somewhat differently when interrogating someone accused of a crime. A person who has committed an offense for the first time and subsequently repented would already prior to the interrogation often feel strong pangs of conscience, a burning sense of shame and remorse over what he

had done. If he sees in the investigator a person who seems to sympathise with all his troubles, and one who is guided solely by the desire to learn the truth, the offender might come to trust the investigator, believing him when he says that an open-hearted confession and giving a truthful account of what happened would alleviate his [the offender's] guilt. The idea that both the investigator and the accused are mutually interested in the latter's truthful evidence would be the basis for establishing contact between them in such cases.

The investigator's emotional state and mood also play an important role in establishing contact with the accused. The unbiased approach that the investigator must observe in no way signifies that the latter's stance should be one of total indifference. The anger and contempt felt by the investigator when questioning a criminal would, in effect, be natural sensations. However, it would be inadmissible for the investigator to humiliate, insult the accused and/or be rude to him. As a matter of fact, even when the investigator openly shows his negative attitude toward the accused and the crime with which the latter is charged, this should not only not prevent him from establishing the needed contact with the accused but occasionally be highly helpful in doing so, for the examinee would see in the investigator not just a cold official but a human being who reacts emotionally to those situations which his official duties confront him with, someone capable of understanding. What matters is precisely how the investigator shows his emotions.

It might be more difficult for the investigator to establish contact with the accused who has decided to deliberately give false evidence and who has, moreover, been convicted before. Sometimes, he might fail to do this in such a situation. The interrogation would then turn into a show of hostility, and the investigator's psychological task would be to make the accused respect him and feel the futility of his attempts at deception. This would already be the first step toward establishing contact and inducing the accused to testify truthfully.

A free account by the accused should be preceded by the investigator's question on *whether the accused pleads guilty to the offence with which he has been charged.* In fact, a free account essentially begins with the response of the accused to that question.

The accused may plead fully or partially guilty, or not guilty at all. Significantly, the fact that the accused has or has not pleaded guilty would in no way be a criterion for assessing his subsequent testimony. Even if he does plead guilty, this does not necessarily mean that his testimony was truthful; similarly, denial of guilt does not invariably mean that his testimony is false.

The interrogation of an accused who has pleaded completely guilty would, as a rule, be peaceful, except in cases of self-incrimination or attempts to conceal or detract from the guilt of some accomplice. Yet, the fact that an interrogation is peaceful does not mean that the investigator's role is merely to record the evidence given by the accused. The latter must give detailed evidence concerning all the circumstances to be proven in the case. This should not involve merely general statements of guilt and about the nature of the offence. By conducting an active interrogation, the investigator will obtain detailed evidence not only about the crime itself but about its causes, motives, preparation, conducive circumstances and ways of concealing criminal traces and the criminal himself.

After the examinee is through with his free account, the investigator should ask him questions. It is highly important not only supplement and specify evidence already obtained but to acquire information with which that evidence could be verified and corroborated by other evidence. This is essential inasmuch as a guilty plea by the accused that is unconfirmed by other evidence could not serve as sufficient grounds for conviction. The following factors may serve as such control evidence: (a) indication by the accused of persons whose testimony could corroborate his own evidence; (b) indication by the accused of hiding places for criminal tools, stolen valuables, documents and other objects that, if found, could confirm the evidence given by the accused; (c) mention of circumstances that could objectively corroborate the testimony of the accused, e.g., about a workshop accident witnessed by the latter, in other words, circumstances that may have been known to the examinee only if he were really present in the given place. Soviet criminalistics and investigation practice resolutely reject the "geographic ruses" used by bourgeois investigators.

"Geographic ruses" are innumerable. For instance, a suspect might declare that he was taking a walk far from the scene of a

crime. Then the investigator would tell him of some imaginary fire or traffic accident that he was sure to have noticed if he were really there. If the suspect is lying, he would instantly agree; but if he is telling the truth, he would indignantly deny seeing such a thing.

When a suspect is trying to prove he was driving a car far from the scene of a crime, the investigator would apply the same approach to him after having learned his itinerary. He might, for instance, turn the suspect's attention to some imaginary happening on the way, like the bursting of a watermain and flooding of the street along which the man was driving, or earth-moving works in some specific place, and the resultant need to make a big detour. The main thing in such cases would be to make the suspect "swallow the bait" in the hope that it would help him prove his alibi.

Indeed, the suspect could really be entrapped this way. However, he would then never again trust the investigator throughout the whole inquiry; nor would he ever believe that the latter is guided solely by the desire to establish the truth; since no end can justify illegal means.

An interrogation of an accused who partially pleads guilty differs in that, in addition to truthful evidence, the investigator must also deal with false evidence, and therefore has to decide how best to expose the lie; the same would concern an interrogation of an accused who pleads not guilty.

Soviet law does not compel someone accused of a crime to testify; nor does it forbid him to give false evidence. But the investigator must always bear in mind that, generally, the accused knows better than anyone else everything related to preparing and concealing the given crime and also why it was committed. The evidence contained in his testimony may prove indispensable and its absence could affect the completeness of the inquiry. Besides, by obtaining complete and truthful evidence from the accused, the investigator would substantially quicken the inquiry, since he would learn of other sources of evidence and thus save his valuable time. All this reveals why it is important not only to expose the accused of lying (if he has indeed chosen to do so), but also overcome his refusal to testify.

The following tactics could help the investigator overcome the accused's refusal to testify:

(1) convincing the accused that his stand is wrong;

(2) making use of the fact that the accomplices of the accused have testified;

(3) compelling the accused to testify by telling him of testimonies by his accomplices that expose him; and

(4) making use of disputes among his accomplices.

To convince the accused that his stand is wrong and to make him change it, the investigator must explain to him the possible consequences of his refusal to testify, namely, delay of the inquiry and difficulties in determining the degree of guilt of his accomplices and in revealing circumstances that might mitigate his guilt or exclude his responsibility. If the investigator tells the accused that his accomplices have already testified, this might induce him to follow suit. If such a statement is not enough, the investigator may tell him (naturally if it is true) that his accomplices have accused him of being the culprit. The investigator should not acquaint the accused with the content of his accomplices' testimonies until the accused himself has testified. Finally, in changing his stand, the accused may be motivated by fear of pleading guilty too late, provided the investigator can convince him that it would be better for him to testify before his accomplices start talking, or, at any rate, not to be the last one to do so.

The tactics used in interrogating a suspect do not essentially differ from that applied to the accused, albeit they are characterised by certain specific features stemming from the fact that the data available to the investigator concerning the suspect's personality is usually less informative than that about the accused.

When questioning a suspect, the investigator does not possess as much evidence as when interrogating the accused. Yet, he has the element of surprise, especially during the first interrogation when the examinee might still need to think over his line of defence, being utterly unaware if proof of his guilt is available to the investigator.

Both when interrogating a suspect and the accused, apart from the need to obtain evidence regarding the circumstances of a given crime and other possible crimes committed by the person in question, the investigator must find evidence on crimes perpetrated or planned by other persons. This task may be termed exploratory, and its solution is very important if past crimes

are to be exposed and ground work with regard to the given investigation performed.

5. INTERROGATION TACTICS IN EXPOSING AN EXAMINEE OF LYING

During an investigation, the investigator may have to expose witnesses, victims, suspects or the accused of lying. False evidence could be given concerning any circumstance in a given case in the hope that it would be confirmed by the other evidence falsified by persons interested in the outcome of the case. The examinee could give false evidence both to protect and damage (by self-incrimination, for instance) his own interests.

In giving false evidence, the person in question would most frequently be motivated by:

(a) fear of spoiling relations with other people involved in the case; fear of revenge by the suspect, the accused or their contacts.

(b) a desire to shield the suspect or the accused, or to alleviate their guilt due to family and/or friendly relations, because of selfish considerations, or, conversely, to aggravate their guilt, being guided by vengeance, jealousy or other base motives;

(c) the victim's intention to exaggerate the damage done to him by the crime, being motivated both by the desire to avenge himself and to make a profit, and also by other base motives such as jealousy, spite, etc., or by the desire to belittle the material damage done to him so as to conceal the sources of his lost valuables;

(d) a desire to shirk responsibility for what he has done, to belittle his guilt, or be convicted not for the given crime, but for a smaller one, either real or imaginary; a desire to denigrate his accomplices so as to take vengeance on them or ensure his own security in future;

(e) a desire to incriminate himself because of some mental illness, or wish to secure for himself exclusive living conditions for family or career reasons. Self-incrimination could be caused by a desire to conceal the unseemly behaviour (even criminal actions) of one's close relation.

The investigator could start doubting the reliability of evidence both during and after the interrogation. During question-

ing, such doubts could be caused by contradictory evidence, change of evidence, lack of logic in the examinee's testimony, and patent non-correspondence of that testimony to the evidence available to the investigator.

The investigator may discover that the obtained evidence is false when, after the interrogation, it has been verified by other investigatory actions, e.g., by checking and specifying it on the spot, by conducting an investigation experiment, by confrontation, etc. Evidence may also be recognised as false through the questioning of other persons, by some newly revealed material evidence, and by resolutions of experts.

When the examinee gives false evidence, it often results in a conflicting situation of the interrogation. In fact, it would be difficult or even impossible for the investigator to establish contact with the examinee when the latter has been exposed of lying. In this case, both the examinee and the investigator would usually be under emotional stress, and their reaction would become highly sensitive. This could lead to the examinee's psychological frustration and to the provoked frustration of the interrogator.

The tactics of exposing an examinee in giving false evidence may be classified into three groups, namely (a) techniques designed to cause emotional stress in the examinee; (b) techniques designed to influence the examinee rationally; and (c) tactical combinations. Naturally, this classification is purely relative since the same technique, in one situation could prove effective precisely by virtue of its emotional effect on the examinee and, in another situation become a means of logical persuasion.

Techniques designed to cause emotional stress in the examinee. In exposing a witness and/or victim in a lie, these would include argumentation by the investigator designed to convince the examinee that his stand is wrong and that he is not performing his civic duty; to explain to him the legal consequences of false testimony and the possible harm it could do to his close relatives (who might number among the victims, suspects and accused in the case); and to play upon his possible good qualities, e.g., self-respect, noble nature, etc.

The following are techniques desiged to influence a falsely testifying suspect or the accused emotionally:

(a) to induce him to repent and frankly confess his wrongdoings by explaining to him both the harmful consequences of

denial and lying and the beneficial results of pleading guilty and actively helping in the investigation of the crime at hand and also past unexposed offences;

(b) to play upon the examinee's good qualities and to take advantage of his affections, likes, possible high professional skills and desire to keep up his professional prestige, etc.;

(c) to play upon the examinee's antipathy toward one of his suspected accomplices, his humiliating dependence on those accomplices, and his doubts concerning their "reliability" and ability to stick to the end to the previously agreed line of behaviour during the inquiry;

(d) to use the factor of surprise by putting unexpected questions to the examinee when the latter does not anticipate them, or to unexpectedly present to him evidence which, in his view, it was impossible for the investigator to possess.

An inquest into the murder of Anna Andreeva and their two-year-old daughter Margarita by her husband, a certain Getman, provides a classical example of such techniques.

At the initial interrogation, Getman admitted that, together with Andreeva, he left Morshansk for Moscow. From here he intended to go to the Far East to make his home. According to Getman, on the evening of their arrival in Moscow, Anna took Margarita to visit a friend, and never showed up again. He claimed to have tried to find them, but with no success.

The inquiry was going nowhere. The investigator had almost no evidence against Getman. Nor could he establish that a homicide had in fact taken place since Andreeva's and Margarita's bodies had not been found either in Morshansk or Moscow.

For several days, the investigator carefully studied Getman's biography in the hope of finding something suspicious that would help him decide on a further course of action. But nothing could be said against him; nor could his acquaintances testify to anything about his behaviour that might compromise him. Getman himself stubbornly insisted on his initial testimony, and he did so in a quite firm and clear manner. Perhaps the crime would have never been disclosed if not for a pair of ladies' shoes, which, as the investigator found out, Getman had sold to a school janitor some time after Andreeva's disappearance. The shoes were shown to Andreeva's sister and mother, who identified them as hers.

To verify their testimony, the investigator showed the shoes

to the schoemaker from whom Andreeva had had them made to order. The man also unhesitatingly identified them, pointing out he would always recognise his own work by the welt and nails.

At another interrogation of the suspect, the investigator put the shoes on his desk and covered them with a newspaper so that only the toes were visible. When questioning Getman, the investigator did not speak of the shoes, asking different questions.

The investigator sensed that Getman was becoming increasingly tense and that the psychological atmosphere of the interrogation was getting increasingly oppressive for him. He also saw that Getman answered his questions in a distracted manner and could not take his eyes off the shoe toes showing from under the newspaper, as if being hypnotised by them.

This fact spoke for itself, but the investigator waited patiently for Getman to mention the shoes on his own initiative. All happened as he had envisaged.

"Tell me, why do you, the investigator, have ladies' shoes on your table?" asked Getman, not being able to contain himself any longer.

"The reason is, Ivan Dmitrievich, that these are the shoes of Anna Andreeva who has been killed by you. They serve as a material evidence in your case and expose you as a murderer. That is why they stand on my table. Have a look at them," he said quietly and took away the newspaper.

Having recognised the shoes, Getman jumped up to his feet. He demanded in agitation that the terrible evidence of the crime be taken away. In the end he pleaded guilty of the murder of his wife and daughter. He told the investigator he had done it in the environs of Moscow, on the shore of a distant lake, because he wanted to get rid of the woman and the child.

In this episode the sight alone of the shoes belonging to the victim was enough to excite the suspect and create an emotional tension which was relieved by his pleading guilty. As he was watching Getman, the investigator sensed his tension build up and appraised it correctly. The question arises, however, whether an examinee's excitement can always be interpreted as a proof of his (her) guilt or lying and, vice versa, his calmness as a proof of his innocence and truthfulness.

In effect, this question touches upon a very important crimi-

nalistic issue: can manifestations of a given physical or moral state of an examinee, e.g., excitement, despair, confusion, change in countenance, etc., serve as evidence? And can the confusion that a suspect feels when the investigator asks him of his involvement in a given crime be taken for proof of his guilt? Again, during a confrontation would obvious attempts by a witness to sit so that his counterpart could not look him in the eyes prove that the former's testimony is false? Soviet criminalistic says "No". Such physical manifestations and specific behaviour, though revealing emotional excitement, could in no case be used to determine guilt. Here recall Sherlock Holmes, who told Doctor Watson: "...The motives of women are so inscrutable. You remember the woman at Margate whom I suspected for the same reason (she sat to have the light at her back.—*Authors*). No powder on her nose—that proved to be the correct solution. How can you build on such a quicksand? Their most trivial action may mean volumes, or their most extraordinary conduct may depend upon a hairpin or a curling tongues." At the same time, however, an examinee's behaviour could sometimes help establish the truth.

Techniques designed to influence the examinee logically are used to logically prove to him that he has been exposed as a liar, show him that his testimony does not hold water and that he has no way out but pleading guilty. Such techniques, for example, include:

(a) presenting evidence refuting the examinee's testimony. There are two ways of presenting the examinee with evidence: consecutively, moving from less weighty to more weighty evidence, and starting with the most important evidence. An investigator chooses one of these methods, depending on the personality of the examinee and the nature of the evidence in question;

(b) presenting evidence requiring from the examinee a detailed testimony that will lead to contradictions between his evidence and that of his accomplices;

(c) logically analysing the contradictions present in the examinee's testimony which are inexplicable from the standpoint of his explanations of a given event;

(d) logically analysing the contradictions between the interests of the examinee and those of his accomplices and trying to prove that the examinee's position is senseless, since it cannot in

the final account, prevent the investigator from establishing the truth.

Techniques aimed at influencing the examinee logically are highly effective in exposing the false alibis of the suspect or the accused. Besides, these techniques could also very well be used in cases of so-called "passive lying", where the examinee seeks to conceal the truth by telling the investigator "I don't know", "I don't remember", "I didn't see anything", etc.

Tactical combinations. These imply creating a situation whereby the examinee might jump to the wrong conclusion, something that could result in his exposal. The use of tactical combinations should not be confused with deceiving the examinee, giving him false information or distorting true facts. A tactical combination implies the creation of a situation based on true facts that could be interpreted by the examinee in two ways, either correctly or incorrectly. Tactical combinations would normally be used:

(a) to create in the examinee an exaggerated idea about the investigator's knowledge of the circumstances of a given case;

(b) to conceal from the examinee the investigator's knowledge of certain circumstances in a given case; and

(c) to conduct an indirect interrogation by posing questions, which, from the examinee's viewpoint, would be secondary but could actually mask the main question concerning his involvement in a given crime. For example, if the fingerprints of the accused were discovered at the scene of crime, the investigator would first pose questions, the answers to which would later make it impossible for the accused to claim that the prints had been left earlier or later and not during the crime itself.

The use of such tactical techniques dates back centuries. Ali Safi, a 14th-century writer, cites the following case from forensic practice in his *Amusing Tales About Different People.*

Once, two litigant came to a justice. One claimed the other owed him lots of gold, but the other denied this and insisted that he was seeing the man for the first time. Then the justice asked the plaintiff where he had given the other man the gold. The man answered that the action took place under a tree growing in the desert three miles from town. The justice told him to go and bring him two fresh leaves from the tree so he could question them as witnesses and learn the whole truth.

The plaintiff went to fetch the leaves, and the respondent seated himself to wait. Meanwhile, the justice set about other business, but amidst one case he suddenly turned to the man and asked him whether the plaintiff had already reached the tree. The man answered that he thought that not. Then the justice asked him how he could know this if he had never been there with the other man. The man became confused for he had been exposed as a liar.

It is very difficult for an investigator to correctly select and use the needed tactical device, and assume the proper tone during an interrogation. Probably for that reason, it is highly tempting to use interrogation techniques that allegedly do not allow a man to lie, for example those involving hypnosis and narcotics, "truth serums", etc.

The attempt to obtain evidence by some simpler, even illegal device (which from the viewpoint of Soviet criminalistics would, in itself, be criminal) has often been resorted to by bourgeois police and courts. But in reality, those who suggest the use of some "truth serum" or hypnosis are not interested in establishing the truth. Rather, they are tempted to paralyse human willpower and obtain desirable evidence that might not necessarily be truthful.

The "truth serum" most often used is scopolamin, which, when injected, paralyses the examinee's will. An interrogation conducted with the use of narcotics is basically an old device. More than two thousand years ago, the Chinese used Indian hemp (hashish), and the Aztects a narcotic extracted from cactus for the purpose. Alcohol has also been widely used for similar purposes. It was quite by chance that the properties of scopolamin were discovered in the early 20th century when medics began to prescribe it together with morphine to alleviate the sufferings of women in labour. Under the effect of the narcotic, women were inclined to be unrestrainedly frank and say things they would never say otherwise. Moreover, scopolamin proved to totally erase memories of recent events. These properties prompted Robert House, a physician from Texas, to propose in 1922 to use scopolamin for questioning persons suspected of lying. His report caused a sensation, and the American press scathingly termed it "truth serum", even though it is not a serum and its use, as practice has shown, far from always helps to establish

the truth. Yet, some people in the United States favoured questioning examinees under the influence of narcotics.

Most European lawyers were against the use of narcotics for interrogation purposes. The Paris Bar Council even adopted a special resolution on the question, and participants in a discussion at the British society dealing with legal aspects in medicine admitted that such testimonies could not be used as evidence. They also noted that a drugged person could give answers that had more to do with his imagination than facts. The participants in the said discussion voiced the opinion that the use of hypnosis or narcotic in interrogation would likewise be totally inadmissible from a purely legal aspect, for a man who, from the medical viewpoint, is unconscious cannot testify.

In 1950, Egypt's delegate to the UN tabled a draft resolution to the General Assembly for banning the use of narcotics during interrogations involving criminal cases. In 1951, the United Nations held a seminar on this question in Brussels, and one of its resolutions asserted that it is absolutely essential that, in all legal systems, the law stipulates that investigation bodies shall not resort to any methods that might weaken the criminal's will or his ability to understand what is going around him, for example, to resort to deceit or hypnosis, even if used with the examinee's consent. The law must also ban the use of any methods that could reduce the criminal's capacity to assess or remember facts. The participants in two other UN seminars in May 1958 and in June-July 1960 arrived at the same conclusions.

Under pressure of public opinion, those Americans favouring the use of narcotics in interrogations changed their stand somewhat. Some began to support lawyers who believed it inadmissible to produce in court as evidence testimonies obtained under narcosis. Others continued to believe that drugs could be used as a device conducive to restoring memory, i.e., when the examinee really suffers from amnesia (loss of memory). Finally, there are those who recognised the interrogation of drugged persons as an admissible and effective means of investigation. Now, some American lawyers are again trying to prove that hypnosis is a legitimate means for obtaining evidence.

As for the US police, many of its members have no scruples about using "truth serum". But, again, they have a choice, since US laws permit the use of such a "scientific" method of question-

ing as a "third degree interrogation", i.e., obtaining evidence by physical coercion. Yet this is a "method" by which they can obtain any testimony, any confession. There have been many examples when absolutely innocent people, if tortured, were ready to plead guilty to the most horrible offences.

Soviet law forbids violent interrogations. The evidence given by an examinee must be the result of his conscious and totally unhampered desire of expression. Naturally, the law demands that witnesses and victims speak only the truth, for that is their civic duty to Soviet justice. But if an examinee is lying, he must be exposed only by use of devices that strictly conform with the requirements of socialist legality.

6. INTERROGATION TACTICS FOR MINORS

The specific tactics used to question minors are largely determined by the examinees' mental state which is characterised by increased suggestibility and auto-suggestibility, inclination to imagine things, high state of emotion, unstable behaviour, etc., and by their partial or total lack of experience that not infrequently results in inaccurate assessments of an investigated event or its individual elements.

In preparing to question a minor, the investigator should pay special attention to discovering the child's degree of development, the extent of adult influence on him (her), and peculiarities of character. Based on this he would choose the interrogation site. Children under fifteen should preferably be questioned in familiar surroundings, e.g., at their school or home, so that the official environment of the investigator's room does not frighten them. On the other hand, the investigator's room could have the opposite effect on children from fifteen to seventeen making them feel a sense of responsibility and the urge to testify truthfully.

Taking into consideration the fact that a child tires easily and is unable to concentrate for a long period of time on the same subject, the investigator should not protract the interrogation. If it nonetheless proves lengthy, breaks would be desirable during which children could be given a chance to play some game and relax.

Apart from intentional reluctance to tell the truth, false evi-

dence by children aged from twelve to fourteen may be due to auto-suggestion and adult influence, of which the children themselves would often be unaware; it may also be a figment of their imagination or the result of an unmotivated desire to lie. When a child invents things without intending to lie, his falsehood would probably be mixed with the truth, and he would invent illogical details.

Minors may usually be exposed of lying by touching upon their emotions. Logical persuasion is generally not very effective both because the children would not be able to understand the fact that they had been exposed in lying and because of their inherent contrariness which will cause them to stubbornly repeat lies that would already be clearly senseless. The second interrogation that would take into account the following factors might also prove effective.

If during the secondary interrogation the child repeats his earlier testimony word for word, using phrases unusual for his age, the investigator would be right in assuming that this testimony is the result of suggestion by adults. Substantial differences in the details of the initial and secondary testimonies would indicate that the child is inventing something, since invented details are usually poorly retained by the memory and substituted for new ones. However, the investigator should in this case also take into account the suggestive effect of his own questions; hence, it is especially important to correctly formulate all questions and to determine their proper sequence.

In interrogating suspects who are minors, the ivestigator should be calm, assured, and friendly, though at the same time insistent and firm. This sort of behaviour would help establish the necessary contact with the teenager and help get him to trust and respect the investigator. If the investigator is agitated, his manner could embitter a teenager even quicker than an adult; as a result he might become sullen, or being frightened and excited, begin contradicting himself and lying. Also, being afraid of the investigator, he might even incriminate himself.

An investigator should try and make it easier for a minor to switch over from false to truthful evidence. This can be done by trying to learn why the child is giving false evidence and by explaining to him that he can and must change his stand, both in the interests of the inquiry and for his own benefit.

Questioning an expert. An investigator may question an expert who has stated his opinion in a given case if he has questions about that opinion which do not require additional examination.

In interrogating an expert, the investigator seeks to gain an understanding or additional information about his opinion. The subject of the interrogation may concern the expert's formulations or terminology in his concluding statement and questions relating to the process and methods of the examination itself; it might also be aimed at questioning the expert's competence and the reasons why his views diverge with those of other experts, if that is the case.

When interrogating an expert, there is no free narration by the examinee. The investigator clarifies all his points of interest by posing direct questions to the expert. As a rule, the expert has the right to state his answers in writing. In interrogating an expert, the investigator seeks to establish: (a) the absence of grounds for ordering an additional or secondary expert examination, if all his doubts and misunderstandings had been resolved during the interrogation; (b) the need for an additional expert examination, if the gaps and obscurities in the expert's statement can not be eliminated by interrogating the latter; and (c) the need for a secondary expert examination, if the expert's interrogation confirmed the investigator's doubts in his competence or the grounds for his concluding statement.

It should be taken into account that the expert's replies, like his conclusion, might be tentative.

Interrogating during confrontation. If the testimonies of previously questioned persons contain substantial contradictions, the investigator has the right to confront them. A confrontation is a simultaneous interrogation of the two previously questioned persons set face to face about circumstances on which they have given contradictory evidence.

Compared with a usual interrogation, the psychological atmosphere of a confrontation is generally more complicated. This is caused by the very presence of a second examinee; by the emotional stress experienced by both examinees in anticipation of being exposed of lying or of being possibly compelled to expose each other of lying; by a feeling of fear for one's own truthful

evidence; or by an uncomfortable feeling or shame for having given false evidence. A confrontation virtually always takes place in a conflicting situation, albeit the acuteness of the conflict itself may vary from open hostility to a mild argument about the correctness of a given statement.

The tactics of confrontation are designed to help eliminate contradictions in the examinees' testimonies. Yet, not every elimination of contradictions is desirable for establishing the truth. The purpose of a confrontation may be regarded as achieved only if existing contradictions have been eliminated on the basis of evidence reflecting the true state of affairs, e.g., on the basis of a testimony by one of the participants in the confrontation, whose evidence concerning the event is not only subjectively truthful but objectively true to fact. In this case, the investigator must also bear in mind possible negative results of this interrogation, when one of the participants in the confrontation, who had previously given truthful evidence, changes his testimony to give false evidence, either intentionally or involuntarily under the suggestive influence of the other participant. Another negative consequence of a confrontation could be that both participants will change their evidence to start giving new, but again false, albeit no longer contradictory evidence.

A confrontation may be conducted between witnesses, victims, suspects, or the accused persons in any combination, i.e., between witnesses, between a witness and a victim, between a victim and an accused, and so on. Depending on the procedural status of a given participant in a confrontation, the law determines his rights and duties. If, during an interrogation, the investigator is questioning a witness or victim, he must make sure that each is aware of his criminal responsibility for refusing to give evidence or for giving false evidence.

In deciding to conduct a confrontation, the investigator must take into account the contradictions in the evidence of both examinees and the possibility of negative consequences of the confrontation. If the contradictions can be eliminated in some other way involving less tactical risk, the investigator should preferably abandon the idea of conducting a confrontation.

In preparing for a confrontation, the investigator should:

(a) choose the right moment; a confrontation would be most desirable when the investigator possesses evidence allowing him

to objectively assess the testimonies of the would-be participants and to determine which testimony corresponds to the truth. This would determine his entire tactical line and sequence of questions during the confrontation. However, if delayed, a confrontation may lose its element of surprise, a factor that could occasionally be to some extent conducive to its success;

(b) study the mutual relations of the would-be participants. This is necessary to determine their possible line of behaviour, influence on each other, significance for one of the participants of possible change by the other of his testimony, and so on;

(c) determine the subject of confrontation, i.e., the range of questionable circumstances to be elucidated;

(d) specify the questions to be put to the examinees and their wording;

(e) determine the sequence of questions to be put to the examinees; and

(f) prepare evidence and other materials that might be needed during the confrontation.

The investigator begins a confrontation by asking the participants whether they know each other and, if they do, what are their mutual relations. This is essential to assess the possible effect of these relations on correctness of evidence. Hence, it is very important for the investigator not just to record general answers on the nature of those relations, but to clarify on what grounds the participants characterise them as such and how these relations are reflected, either in hostility, enmity, or prejudice.

Having clarified the mutual relations of the participants in a confrontation, the investigator suggests that they each give evidence in turn concerning the substance of questionable circumstances.

The established practice is to let the examinee who, in the investigator's view, is telling the truth be the first to testify. This is all the more desirable in cases when there is no certainty that a given person might not change his testimony under the influence of opposite assertions by the other participant. Exceptions are permissible when the investigator believes that the truthful participant will firmly stick to his testimony and could give better-reasoned evidence after listening to the false evidence of a dishonest participant, and also when he may assume that the evidence of the dishonest examinee could outrage the second ex-

aminee so strongly that he would report additional evidence which would expose the other one of lying and even confirm his guilt.

To eliminate contradictions in the evidence given at confrontation by participants, the investigator may present to them suitable proofs, including evidence previously given by them. However, Soviet legislation will only permit the revealing of evidence given by participants in a confrontation before and contained in records of previous interrogations, and also the reproduction of tape recordings of that evidence only after the participants have had their testimonies at the given confrontation put down on the record.

The participant in a confrontation, with the investigator's consent, may ask one another questions. But the examinees should not be allowed to bicker and insult one another.

8. RECORDING THE COURSE AND RESULTS OF AN INTERROGATION

The record is the principal means for recording the course and results of an interrogation, including those of questioning during a confrontation. The interrogation record consists of four parts: (a) examinee's biographical details (last name, first name, year and place of birth, nationality, education, etc.); (b)statement of the examinee's free account; (c) records of questions posed to the examinee by the investigator, and the examinee's answers to those questions; and (d) attestation of the fact that the examinee has been acquainted by the investigator with the records of his evidence and the examinee's signature certifying that the record is correct.

All evidence is to be put down in the record in the first person singular, and if possible verbatim. This is especially important in recording the evidence of a minor when the language itself of the testimony could guide the investigator in deciding whether the testimony is false or true.

Every page of the record must be signed by the examinee. In addition, the entire record must be signed by the interrogator. The examinee has the right to demand that amendments and additions necessary from his point of view be included in the record. All additions and amendments in the record must be certified by the examinee's and investigator's signatures.

When an interpreter, expert, defence counsel, teacher, parents or legal representatives of a minor examinee take part in the interrogation, their names and other essential biographical particulars should be noted in the record, which must be signed by all the participants in the interrogation.

When questioned, the examinee may, either on his own initiative or at the investigator's suggestion, draw various sketches, schemes, maps, and/or pictures explaining his evidence. These documents, certified by the examinee's and investigator's signatures, are appended to the interrogation record.

At the investigator's decision or the examinee's request, sound recording may be applied during the interrogation. However, this does not take the place of a written record of the interrogation; in fact, sound recording is but an additional means for recording evidence.

Soviet law stipulates that the examinee must be informed that the interrogation is to be taped prior to beginning. The law does not permit partial sound recording of an interrogation or evidence intentionally reiterated for sound recording. After the interrogation is over, the tape should be fully replayed for the examinee, who would then confirm its correctness. All additions and amendments to the examinee's evidence must also be recorded on the tape. Under Soviet law, when sound recording is used, the interrogation record must note (a) the use of sound recording and the fact that the examinee had been informed thereof in advance; (b) data on the technical apparatus used and on recording conditions; (c) statements by the examinee regarding the use of sound recording; (d) the fact that the tape has been replayed to the examinee; and (e) attestation by the examinee and investigator of the fact that the record and tape are correct.

Testimonies of examinees taking part in a confrontation must be duly put down in the record in the sequence they were given. The investigator must without fail note in the record of a confrontation interrogation the characteristics of the examinees' mutual relations.

Chapter 15

CRIMINALISTIC METHODS: A SYNTHESIS OF TECHNIQUES, TACTICS, AND PRACTICE IN COMBATTING CRIME

1. THE CONCEPT AND TASKS OF CRIMINALISTIC METHODS

The efficacy of a preliminary investigation, establishment by the investigator of objective truth in a given case and the discovery of the causes and conditions that were conducive to a given crime all essentially depend on how well-grounded and organised the investigator's actions are.

Crimes can be highly diverse. In fact, not only different crimes vary, but even the same kind of crimes would, in every case, differ with regard to investigation methods. This can be readily seen by selecting at random just a few news items.

Santos, Brazil. A visitor, who introduced himself as a film producer, came to see the branch manager of the local bank. He said he was making a gangster movie and would like to shoot the scene of a bank robbery directly on the spot. The manager agreed, and the cameramen brought their flood-lights, cables and movie cameras and began shooting. Masked gangsters dashed in and all the employees fell face downwards, as agreed beforehand. The gangsters cleared the safes and escaped by car, followed by the "movie people". The bank manager lost his head and called the police too late. It turned out the gangsters had precisely followed the scenario of an American film.

Avellino, Italy. The local football team was outside training. Just before, the players had received big bonuses for their good showing in the national championship. The warming up was at its height when three strangers entered the cloak-room. They tied up the team managers at gunpoint, stuck them into the storeroom for sporting gear and calmly took away the players' bonuses and valuables. They escaped unhampered with loot amounting to almost 20 million lires, quite a sum!

County of Kent, Great Britain. A group of burglars penetrated

onto the territory of the local prison, carried away a TV set worth 650 pounds sterling from the Prisoners' Reform Club and escaped the same way as they came, over the fence.

Quite obviously, each of the above-mentioned crimes, like any other crime for that matter, would require an individual investigatory approach that would take into account all the distinctive features of the given offence, the personality of the possible suspect and the motives and aims of his criminal actions. Yet, the fact that the nature of a given investigation is specific does not necessarily imply there could be no general provisions for investigating all crimes of a given class, or that no provisions would apply to the preliminary inquiry in general. A chapter of criminalistics called *methods of investigating specific crimes* or *criminalistic methods* actually deals with such provisions.

Criminalistic methods involve a system of scientific provisions and recommendations based thereon to organise, investigate and prevent specific crimes, e.g., burglary, murder, violent assault, rape and so on.

Based on a scientific analysis and generalisation of investigation practices, and also on experience in using criminalistic tactics and techniques, methods for investigating specific crimes help determine the tasks, sequence and tactics of the actions to be taken in investigating them; they are also used to improve the efficiency and organisation of the investigation process. By accumulating the results of combatting crime and the advances in criminalistic techniques and tactics, investigation methods are, as it were, the cumulative chapter of criminalistics.

Bourgeois criminalists also try to develop scientifically-grounded criminalistic methods. However, they do not seek to find the general regularities inherent in the methods used for investigating specific crimes, but rather hope to develop standardised, abstract logical schemes designed, in their view, to be a "master key" for exposing any crime.

From the standpoint of Soviet criminalistics, the observation of socialist lawfulness in investigating an offence means revealing that crime, exposing the guilty and safeguarding the state, society and individual against criminal offences; promoting conditions that will make such crimes unfeasible in future; and excluding any unfounded institution of criminal proceedings against Soviet citizens.

In developing methods for investigating all kinds of crime, Soviet criminalistics proceeds from its knowledge of various methods that criminals use to perpetrate and conceal their offences, and the discovery of conditions that could determine the choice of a given method and the traces that might occur if it were used.

The practice of investigation has long since confirmed that, despite the individual "pattern" of every crime, the methods involved may resemble those used in committing similar crimes. It is also known that a recidivist normally uses the same technique. In fact, the traces of a given criminal method allow the investigator to form an opinion of the offender's personality.

Inasmuch as any criminal method is a system of actions by a criminal subject, a system to some extent caused by and inherent in his personality, the criminal's personality plays an important role in determining criminalistic methods. In fact, this not only helps to develop correct investigation tactics and determine the investigator's line of behaviour, but also to reveal in the course of investigation the causes and conditions conducive to the crime.

Evidence concerning the victim's personality, i.e., victimologic data (victimology is the study of crime victims) is also important in applying criminalistic methods. In some cases, the victim's behaviour may provoke an offence, e.g., a murder where the criminal acts in a state of temporary insanity, for example, often being insulted by the victim; a rape occurring in connection with the victim's amoral behaviour; bodily injury, when the victim was actually the instigator of a quarrel; and so on.

Criminal investigation is aimed not only at exposing the guilty, instituting criminal proceedings against them and compelling them to compensate for the material damage inflicted by the crime, but at discovering and eliminating the factors that were conducive to perpetrating and concealing that offence. The investigation materials are used to determine ways of preventing similar crimes.

Of major importance in combatting crime is the generalisation of investigation practice, i.e., finding ways and means for coordinating and closely interacting the operation of all the bodies engaged in combatting crime, including investigation agencies, internal affairs bodies and expert institutions. The success of crim-

inal investigation depends not only on a methodically correct approach to the process of inquiry, but on the timely and coordinated actions of all these state bodies, on their ability to organise the forces and means available and enlist public assistance. All these measures must be taken into account in developing concrete investigation methods.

2. CONCRETE METHODS FOR INVESTIGATING CERTAIN CRIMES

The method of investigating specific crimes, e.g., theft, murder, violent assault, rape, etc., involves the following basic measures:

(a) determining the circumstances to be discovered and studied in examining such categories of offences, including also factors that were conducive to the crime;

(b) determining the range of initial investigatory actions and characterising their tactics;

(c) characterising the specific features of tactics of subsequent investigatory actions with regard to the class of crimes analysed;

(d) providing recommendations for undertaking the most effective measures for eliminating the causes and conditions conducive to specific crimes.

Let us now examine in greater detail these component parts of certain specific methods.

Circumstances to be discovered and studied with reference to a given category of cases. These would be specified by investigation methods depending on the given crime, as determined by law and depending on the provisions of the criminal proceedings on the subject and restrictions with regard to which evidence is to be produced.

The following points must normally be proven in conducting a preliminary investigation and during court proceedings:

(a) the crime itself, i.e., the time, method, place and other circumstances characteristic of that crime;

(b) the guilt of the accused in perpetrating the crime and the motive involved;

(c) the circumstances affecting the degree and nature of the responsibility of the accused, i.e., those that would either extenuate

or aggravate his guilt, and also other factors characterising the accused;

(d) the nature and scope of damage done by the crime;

(e) circumstances conducive to the crime.

The general provisions of criminal proceedings on the subject to be proven are determined by the investigation method that distinguishes for each class of crimes a typical range of circumstances to be discovered in the course of investigation. For instance, when a dead body is found with signs of violent death, the investigator must clarify the cause of death, i.e., determine whether death was caused by homicide, suicide, accident, or natural causes; if it was homicide, the investigator must find out what tools were used to inflict the injuries on the body, the site of the killing, the identity of the murderer, the motives of the murder, the precise way in which the murder was committed and when; the traces of the crime that may be found on the killer; and so on.

In investigating misappropriation of state and public property involving forgery of documents, the investigator must learn whether it was really theft; what documents were used in perpetrating the crime; who forged them; what amount of property was stolen; the whereabouts of the stolen property; to whom it was sold and how; and so on.

Thus, the range of typical circumstances to be clarified is highly diverse. In fact, the circumstances primarily depend on the nature of the crime, its legal significance, the way it was committed and concealed, and the culprit's personality.

By knowing and taking into account the circumstances to be discovered and studied in cases involving a similar crime, the investigator essentially strives to come up with a purposeful plan that will allow him to successfully continue the inquiry.

However, no investigation methods can envisage an exhaustive list of all the circumstances and questions that must be dealt with in investigating a specific crime. The investigator's task is to make this general list more specific, to determine and clarify the factors characteristic of the given criminal case.

Initial investigatory actions. In every specific investigation, it is important to determine the range of initial investigatory actions and their tactics. In this case, the method of investigating a specific class of crimes would be restricted to making a typical

list of investigatory actions indicating the respective sequence.

As a whole, an investigation may be divided into an initial and follow-up stage. In each of these, the investigator specifies a definite range of problems, which, in effect, are formulated by a method instrumental in their solution. We have already dwelt on the tasks to be resolved by initial investigatory actions in a previous chapter devoted to general provisions to criminalistic tactics. At this point, it should be noted that every concrete method indicates the specifics of these tasks with reference to a definite category of criminal cases and correspondingly reveals the possibilities of initial investigatory actions typical of the given category.

It is hardly possible to cite an exhaustive list of initial investigatory actions common to all categories of criminal cases. However, by analysing and generalising these actions, one can make certain inferences to help draw up a typical list and establish their usual sequence for each category of crimes.

For instance, in cases involving the discovery of a corpse with signs of violent death, urgent actions would involve inspection of the scene of the crime and the corpse; a forensic medical examination of the corpse; questioning eyewitnesses; and pursuing and detaining the murderer; in cases of theft—the inspection of the site of the theft, questioning the declarant, questioning the witnesses, and search for the stolen items; in cases involving rape—questioning the victim, subjecting her/him to a forensic medical examination; inspecting the scene of the assault and questioning, examining and searching the suspect.

Depending on the nature of the investigated event and its concrete circumstances, the sequence and list of initial investigatory actions might vary.

Specifics of follow-up investigatory actions. In the next stage of the investigation—the follow-up—other tasks, such as collecting, checking and assessing evidence are being solved by means other than the initial ones.

Criminalistic tactics studies and develops techniques of specific investigatory actions, e.g., inspection, search, interrogation and so on. However, in developing the tactics of a given investigatory action as such, one cannot take into account all the specifics that these tactics would acquire depending on what class of crime it is designed to investigate. It is clear, however, that

the tactics of questioning a witness in a case involving theft would differ from that used in questioning a witness of, say, a traffic accident. And it is criminalistic methods that would take into account the specific tactics of concrete investigatory actions to be used depending on the type of crime involved. In turn, an investigator inquiring into some concrete crime should take into account the specifics of those actions, e.g., specifics of inspection revealed by the said methods, and concretise their techniques with regard to the specifics of a given case. It could be that not all the general recommendations of a given method should be applied in that specific case; conversely, it might turn out that a given investigatory action might have specifics that cannot be foreseen. Hence, the investigator's task is to use the recommendations of a given criminalistic method creatively, not to apply them automatically to any given case.

Revealing and eliminating the causes and conditions conducive to crime. The task of revealing and proving the causes and conditions conducive to the criminal action is resolved in the course of inquiry into a given case. In fact, the causes may be revealed both during investigatory actions designed to reveal other circumstances in the case and when undertaking actions specially designed to establish them.

Having established the causes and conditions conducive to a given crime, the investigator should take measures stipulated by the law to eliminate them. Under Soviet law, the basic measure is to make the enterprise, institution or organisation concerned responsible for eliminating these causes and conditions. Moreover, some specific methods may also recommend that the investigator publish relevant articles in the press, address meetings of work collectives and appear on television.

Chapter 16

CRIME MUST BE PREVENTED!

At the end of the 19th century, capitalist countries were flowed over by a wave of organised crime. Jurists, interior ministry officials, procurators and judges all tried to understand the underlying causes and what made even respectable white-collar gentlemen take to swindling and assault; they also strived to learn why capitalist society was failing to provide security for its members and, more importantly, could not safeguard private property, the holy of holies of capitalism.

In these conditions of incipient deterioration of bourgeois lawfulness, Italian psychiatrist Cesare Lombroso's theory about a "born criminal" seemed well-founded. Lombroso developed a "natural-science" theory which declared crime inherent not only in human society but even in the animal and plant kingdoms, a phenomenon as natural as birth and death. In Lombroso's view, there are "born criminals", people whom nature itself has predestined to criminal actions by virtue of specific biological features. A "born criminal" is characterised by specific physical and mental habits. There are several types: thieves, murderers, rapists, arsonists, etc. There is also a special type of "political born criminal" who is characterised by the innate desire to overthrow the existing state system and social order. In fact, the theory alleged that Marat, Robespierre, the Paris Communards, Kropotkin and leaders of the First International were all "political born criminals". Such was a true political nature of the "natural-science" theory of crime and its author.

Lombroso also developed a theory on preventing crime as a biological phenomenon. The tenets were very simple: "born criminals" should either be subjected to medical treatment or be isolated from society for life, or, in hopeless cases, exterminat-

ed. In fact, there should be no need at all to wait till a person commits the crime he is "predestined" to. Preventive measures should be taken as soon as he is revealed to be a "born criminal". Nor is there any need for guarantees of legality, or for law, or for courts: special commissions for taking security measures against real or potential infringers of the law would be the arbiters of their destiny.

Lombroso's present-day followers now speak of a "predisposition to crime". By rejecting the social nature of crime, they free the capitalist system of responsibility for the existence of crime. In fact, their views serve to cover all kinds of reactionary "security measures" and racist policies that have already once led to extermination of tens of millions of people in Nazi Germany.

Naturally, no bourgeois criminology theories can explain the unprecedented scope of crime in capitalist countries, where even prime ministers and criminal police chiefs (remember Peru!) may fall victim to street robbers, or when a government member in the Province of Quebec, Canada, is compelled to resign because he was caught red-handed in a department store trying to steal a $120 jacket.

Newspapers in capitalist countries are full of reports about brazen crimes, often perpetrated with horrible brutality and cynicism. But even against this background, the case of Patricia Hearst, daughter of the American newspaper tycoon, stands out.

This very unusual case, even for the United States, began with the young woman's abduction. In their letter to her father the kidnappers, who called themselves the Free Liberation Army, declared Patricia hostage and demanded that in exchange for her release the Hearst press publish their declaration and pay a large sum of money to the San Francisco poor. Later, however, it turned out that this political manoeuvre was intended for self-publicity. In reality, the Free Army, under the guise of leftist slogans, was a criminal gang of plunderers and murderers.

After some time, Hearst, having partially complied with the terrorists' demands, received a letter from his daughter. Patricia informed him that she had come to share the views of her abductors and had decided to remain with them. This was followed by a series of new grave offences by the gang, and Patricia took a very active part. For instance, when they attacked a San

Francisco bank, hidden cameras took pictures of Patricia holding the frightened customers at gunpoint while the other gangsters cleared the safes.

A year and a half later, Patricia was arrested. On the strength of all her crimes, she should have been sentenced to life imprisonment. But then her father came on the scene: for $200,000 he hired a famous lawyer known for his resourcefulness, who persuaded the jury that Patricia "was just a weak-willed victim of madmen". She was sentenced to seven years of gaol, but just three years later "poor Patty" was released by presidential decree.

The bourgeois police can no longer cope with the wave of professional organised crime. For example, the Egyptian police forces conduct real military operations against criminals. In fact, over three thousand officers and men took part in one such operation, and though it was conducted some one hundred kilometres from Cairo, sounds of gunfire were heard in the capital, too.

American psychologists performed an interesting experiment. Feigning a car robbery, they intentionally left the car with open doors on a road near a district of well-to-do residents. The people driving past thought that the car owner had been assaulted on stopping the vehicle, and now ran to call the police.

During the thirty minutes after the beginning of the experiment five cars stopped one after another near the abandoned vehicle. But the drivers were in no hurry to help its victimised owner. On the contrary, all five grabbed something from the "abandoned" car and the last driver even tried to remove a door. All this shows that crime has literally overwhelmed bourgeois society.

Soviet lawyers believe crime to be a socially- and historically-conditioned phenomenon, which reaches its peak under capitalism to erode it from inside. Having appeared under exploitation of man by man, crime can be eliminated only after doing away with exploitation. Socialism has, in fact, eliminated this principal and fundamental social cause of crimes. Hence, in the USSR there are realistic objective conditions for eradicating crime. The growing material and cultural level and social awareness of the Soviet people create all the necessary conditions for this. In the USSR crime prevention is a matter of utmost importance. Soviet jurisprudence, especially the methods and recommendations of criminalistics, criminal law, criminal trial and criminolo-

gy, provide serious help in solving this national task facing all public organisations and government bodies, including, naturally, the USSR Ministry of the Interior, the procurator's office and the courts.

With regard to their role in preventing crime, criminalistic means are classified into:

(a) those for establishing the causes and conditions conducive to commitment or concealment of crimes;

(b) those for obtaining information about planned crimes;

(c) those to be used for criminalistic protection of various objects against criminal infringements.

It would be impossible to prevent crime without establishing the causes and conditions that help encourage and conceal criminal offences.

Yet preventive measures consist not only in eliminating conditions that have made crimes possible. Crime could also be prevented by creating an environment that would make it difficult and when the obstacles confronting the criminal would force him to abandon his schemes. If a crime can be readily concealed and if a criminal has sufficient grounds to assume that his actions will not be discovered, he could be sure he would get away with it. On the other hand, if conditions conducive to concealing crimes are eliminated, the criminal would realise that his exposal and punishment would be inevitable and this would undoubtedly play a serious preventive role, particularly in regard to vacillating elements.

An investigator seeks to establish the causes and conditions conducive to perpetrating and concealing criminal offences and obtains information on imminent crimes when performing different investigatory actions, such as inspection, experiment, interrogation, search, etc.

The drying plant of a peat briquette factory caught on fire. This happened when the shift superior ordered the current switched off because of a power shortage. The fire started when the plant was switched on again. Then the workers switched off all the dryers and ventilators and called the fire brigade but the time they arrived, the flames were already raging on four floors.

When the firemen inspected the scene of the conflagration, they discovered that one of the drying plant aggregates was faulty

and had periodically caused sparking, which, in fact, had ignited the dry peat dust. The faults in the aggregate were not revealed in time because maintenance did not involve regular lubrication and preventive inspection. An inspection of the scene revealed that ignition in the drying plant was caused by a violation of the production process, namely, by the untimely scavenging and cleaning of the desiccator pipes of peat; by insufficiently tight sealing of the peat supply equipment and dust-suction system; by absence of self-recording devices, etc. The inspection also made it possible to plan some preventive measures against similar future accidents.

One of the purposes of an investigation experiment is also to establish the circumstances that facilitated a crime or made it possible at all. For instance, in a case involving the robbery of TV sets directly from the factory, the accused testified that his actions were facilitated by the slipshod attitude of the guards, who were careless in inspecting the lorries leaving the works. The accused declared that he hid the two TV sets in factory cases under the bonnet of the car, bearing in mind that the guard would never bother to look here anyway.

This testimony caused doubts and required experimental verification, during which the accused showed how he had put the sets under the bonnet and proved it was possible. The result of this experiment showed that one of the conditions conducive to robberies at the factory was the careless attitude of the guards, and measures were taken to prevent such crimes in future.

The conducting of searches has substantial significance in preventing crimes, since it could reveal criminal tools, which the investigator can remove thus preventing their being used to perpetrate new crime; a search may also produce documents (letters, diaries, etc.) containing information about planned crimes. Such information could essentially be obtained by questioning people and also through statements and reports made by the general public to the militia or to the investigator concerned.

With reference to evidence obtained in specific criminal cases, militia operatives, investigators and court justices may address the local people to inform them about various criminal methods and about suitable measures against thieves, swindlers, etc.

After examining documents formalising the transfer of goods and materials, Soviet criminalist A.A. Levi established that such

a simple measure alone as accurate implementation of instructions on formalising and forwarding documents would make forgery difficult. When columns in a document are incompletely filled out or contain abbreviations, when the sum total is not written out in words, or when a document contains unwarranted empty places, forgery is facilitated and a would-be criminal could sometimes even be led to think forgery to be feasible. Special brands of paper, whose qualities hamper erasure, etching and washing off of the text, also protect against forgery. The same would concern a protective netting, a fine coloured interlacing pattern lithographed onto the paper surface. Attempts to erase or etch the text would, in the first place, damage the netting, and this would be revealed even at the most superficial examination of the document with the naked eye.

Based on the results of expert examinations of documents, criminalists develop special recommendations aimed at making forgery difficult or even impossible, or at creating conditions in which any forgery could be revealed in time and the forger exposed. For instance, criminalists suggested that the list of important account forms be revised and expanded and the forms of wage sheets improved so they could be filled out as specified by rules for formalising bank payment documents; the column where the signature to certify receipt is to be affixed should be at least six-seven centimetres wide so that one's name could be signed in full, thus making forgery difficult. The requirement not to allow simplified signatures that do not contain all the surname letters (in the form of arbitrary strokes) in financial documents would also serve this purpose. Besides, it has been recommended to introduce a system under which all financial documents, in addition to recipients' signatures, must clearly indicate their last names, which they would write with their own hand.This would make it easier to find the signatory.

Traffic accidents are on the rise, and large groups of experts from different fields are doing their best to develop various preventive measures. Since the summer day of 1896 when the first fatal traffic accident was recorded in Britain, over 400,000 people have died there. Despite the fact that speed limits have been imposed all over the country, drivers continue to break them everywhere. The British police have installed TV cameras to catch transgressors, and patrol motorcycles are supplied with photo cam-

eras with which the policeman can instantly record a violation of traffic rules.

In the USSR, a special research institute is studying the problem of traffic safety, and criminalists are also making a contribution to preventing traffic accidents.

Criminalists specialising in the study of clues also develop effective preventive measures. Some time ago, a Soviet criminalistic expert institution conducted a whole series of examinations on cases involving safe burglaries. In all the cases, the safes were forced in the same way due to substantial faults in the lock design: by means of simple manipulations, the burglars would tear the lock from the door, to which it was secured with by screws turned by only two or three threads. However, such crimes were rendered impossible when the lock manufacturing works made simple improvements in the lock design and in the system of its attachment to the safe door, as recommended by criminalists. The latter also made a number of useful proposals on improving the designs of containers, storages, telephone coin boxes, seals, etc.

In all these cases, criminalists have developed preventive measures based on the investigation results of past crimes. They were simply told that their task would be to prevent new crimes by previously used methods. But it is common knowledge that every science also has a prognosticative function; based on familiar regularities, it should be able to foresee future events and their possible variations; criminalistics is no exception. In studying criminal methods and facts influencing their development and choice, criminalistics forecasts new criminal techniques caused by a changed situation. This allows early development of measures that would make those techniques unfeasible and thus prevent crimes involving their use.

Criminalistic means of preventing crimes are but a link in a whole system of preventive measures practised in the USSR to completely eradicate crime. The principal measure is educative work whereby society and work collectives morally influence their members. The entire process of preliminary investigation, designed to help the criminal realise all the gravity of his offence and encourage him to break with the past and take the road to reform, also plays an educational role. All the good that still remains in an offender must be used by the investigator to rehabilitate him morally.

A certain Vladimir Sh. was arrested in Alma-Ata after escaping from prison. He had previously committed ten burglaries. He pleaded guilty, and when the investigator talked to him he noted that the young man was highly interested in poetry, knew many poems by heart and understood their intrinsic meaning pretty well. It also turned out that Vladimir wrote poetry himself. When telling the investigator about his love for poetry, he stated his deep regret about having become a criminal and admitted that this had happened under the influence of an inveterate thief.

One day, Vladimir asked the investigator to introduce him to a man of letters so he could ask his advice about writing good poetry. Realising that to comply with this request would help reform the accused, the investigator persuaded a poet to read Vladimir's poems. The poet did so and noted the prisoner's literary talent. He gave Vladimir much advice, and the latter began writing poetry with even greater ardour. After the inquiry was over, Vladimir told the investigator that he would break with criminals for good to henceforth firmly take the road to complete reform, and he kept his promise.

Thanks to the active participation of the people in protecting public order and also to the extensive educational work and efficiency of Soviet administrative bodies, crime has not been committed for a long period of time in hundreds of populated areas in the USSR. This is the result of large-scale preventive measures. It is the task of every Soviet citizen to contribute to measures that will make the word "crime" disappear from the lexicon of all Soviet towns and villages. And when this happens, criminalists will gladly change their profession.

CONCLUSION

This brings to a close our story of present-day criminalistics and its significance and possibilities in fighting crime. We have tried to show the reader that, today, the process of revealing and investigating crime can no longer involve obsolete methods, that the achievements and methods of criminalistics can be of immeasurable help in achieving effective results. For investigators, detectives, or justices to successfully fulfil their functions today, they must have fully mastered all existing criminalistic methods and techniques; be fully informed of the possibilities of criminalistic and other forensic expert examinations; possess the necessary knowledge of how crimes may be planned, committed and concealed and clearly visualise the ways of exposing crimes. This is why the significance of criminalistics continues to grow, as does the awareness of its importance by practical workers.

Criminalistics is a continually developing science, its progress being due to the efforts of both scientists and practitioners. What appeared unfeasible in the time of Hanz Gross is today often the yesterday of science. The development of criminalistics is promoted by recent rapid advances in the natural, applied and social sciences, from which it gleans everything that can be used in the fight against crime. The reader must be aware that tomorrow will bring even newer and more effective criminalistic techniques, and we therefore suggest that he follow the development of the art and try always be abreast of all its new achievements.

Hopefully, this book will be only the first step in perfecting your professional skills.

REQUEST TO READERS

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This textbook by two Soviet criminalists is designed to acquaint the reader with the brief history, essence, and scientific principles of criminalistics.

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The book is intended for beginners, whose interest in the study of crime is nonetheless professional. Hence, it combines a scientific approach with readily intelligible explanations and examples from current practices in crime control.

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